A SAFETY AUDITING INSTRUMENT FOR ADVENTURE EDUCATION.

THESIS

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By

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CHAPTER I

INTRODUCTION

A common responsibility of the director of an organization which has adventure education as a main focus, is the coordination of all safety practices within the organization. This function is logical for the director's position is at the interface between the operational side of the organization and the policy-making side of the organization; see Figure 1 below.

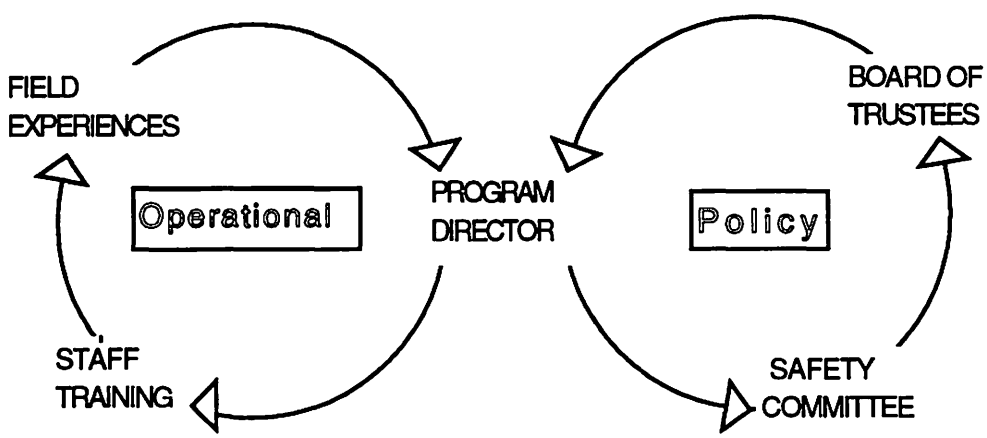

Figure 1: Director's role in an adventure education organization.
(Hale, 1984 p.7).

It is fairly typical of outdoor education centers worldwide that the director is appointed to this administrative position after advancement through the ranks of the operational side of the industry. The assumption is that the person's experience and instructional qualifications lead to good judgement, and this in turn will translate to skillful personnel and safety management abilities. One weakness with such an assumption is that the person generally has had no formal training in safety management, or in administration for that matter. This places the director in charge of the safety of an entire organization without necessarily having the base of understanding to know how to go about meeting the responsibility. The author suspects many outdoor education directors are in this situation. This study came about through a real need experienced by the author as the director of an outdoor education center.

The educational models used in the adventure setting depend on the use of risk (Csikszentmihalyi, 1975; Ewert & Hollenhorst, 1989a; Priest & Baillie, 1987), and thus our very business necessitates that some degree of risk be involved.

> "It is not possible to obtain the benefits of outdoor education (adventuring) without putting staff and students at risk" (Horwood, 1987, p.17).

> "Few of us . . . in adventure programs harbor any doubt that the outcomes greatly outweigh the risks involved" (Meyer, 1979 p.10).

> ". . . risk is essential . . . hazardous environments in which the program operates are necessary to its educational goal" (James, 1980 p.20).

Safety is a particularly perplexing issue in adventure education. On the one hand we need to use appropriate risk, and on the other we have ". . . the ultimate goal of providing high quality, safe experiential activities for the public . . ." (Ewert, 1988c, p.3). The fundamental difference between those involved in adventure recreation activities on their own and the responsibilities that outdoor educators have to those in their care while part of an adventure education experience is;

> " . . . The use of the adventure condition to bring about purposeful educational outcomes . . . (which) . . . results in adventure education involving lower levels of uncertainty and risk" (Hollenhorst, 1987, p.7).

In other words people sign up, or are signed up, for adventure programs to receive the challenge and rewards the adventure experience has to offer, but do not expect to get injured or die.

> " . . . Ironic is the fact that while participants in adventure programs want a sense of excitement and danger, they have no intention of being injured" (Ewert, 1984b, p.27).

This duality of safety and risk is the paradox that all adventure educators are working in.

For the administrator it poses a further dilemma by having responsibility for establishing the fine balance between the two. If one errs too far on the side of risk, the organization can lose business and possibly incur other financial costs through litigation with the occurrence of unacceptable injuries.

> "Because of potential danger and possible accidents many public agencies and schools are questioning the validity of these activities as regular parts of their program" (Ongena, 1981 p.13).
>
> " . . . Public opinion quickly turns against programs that experience even an occasional loss of life" (Mobley, 1981 p.37).
>
> "The reality of this paradox suggests unpleasant metaphorical parallels: the death or maiming of an individual student can mean the death or maiming of the school. The death or maiming of several students can mean the death or maiming of the adventure education movement" (Mobley, 1981 p.45).

If, in contrast, one errs too far on the side of safety, then the very medium of the educational tool - adventure - could be lost. This would result in no value for the participants and a loss of business as clients looked elsewhere to have their needs met.

> "In making a program as safe as possible, such an organization must be careful not to capitulate to the social forces it is trying to resist and reform. Otherwise it too will become jaded by the malaise, and in time, it too will have lost heart and forgotten how to teach the lessons it was created to teach" (James, 1980 p.23).

> " . . . as a result the trend in many recreational and school programs is to make their activities so safe for the participants that much of the risk, excitement and value is eliminated" (Ongena, 1981 p.13).

> " To totally eliminate the critical risk contact points may build an enviable safety record but undermine the 'raison d'etre' of a program" (Ewert, 1984b,, p.32).

This dilemma is much talked about

> " . . . How to eliminate unreasonable risks to participants without reducing levels of excitement, challenge, and stress; essential components of the adventure experience" (Bruner, 1986 p.4).

However while many might see this as an obstacle, others see it as an opportunity.

> "The dilemma of safety versus risk is the critical state-of-the-art issue in the experiential education movement . . . This reality provides one of the strongest progressive forces in adventure education" (Mobley, 1981 p.38).

> " The paradox . . . is also a goal for organizations to build up their support systems for staff working in the field . . . The paradox of safety and risk has been a progressive force" (James, 1980 p.21).

The prime goal then is achieving the fine balance necessary to provide an appropriate level of challenge without compromising the broader definition of safety that encompasses safety of student, staff and organizational continuity. Figure 2 illustrates this balance.

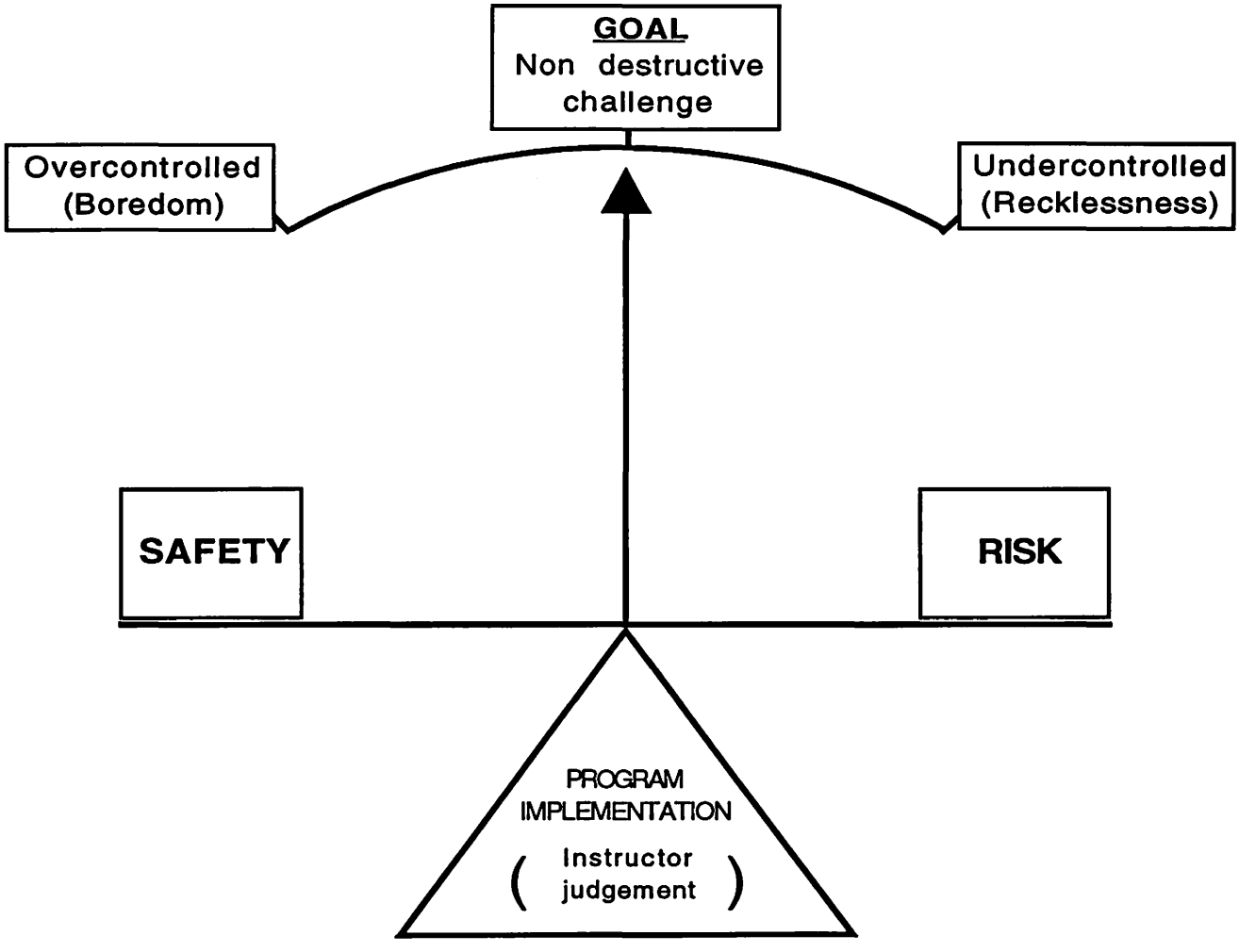

Figure 2: The risk vs safety meter for adventure programs.

Figure 2 shows that the goal of adventure education programs is non-destructive challenge. To achieve this requires risk, and to balance the risk the organization needs to employ suitable safety controls. The higher the risk levels undertaken by the organization, the greater the safety controls required. As discussed previously, if the meter is imbalanced, the needle will swing one way or another, leading to overcontrolled boredom as an outcome on the one hand, or undercontrolled recklessness on the other. As shown in figure 2, the fulcrum of the balance is the implementation of the actual program. No matter what the planned levels of risk are, or what the safety controls are that are employed by the organization, the balance between the two can be completely shifted by inappropriate judgement or supervision by the instructor in the field. If any imbalance exists, the participants, staff or organization will pay the penalty in the short or long term.

There is also the question of the type of risk we are talking about. Adventure educators talk about perceived risk and real risk; many advocating the use of activities which students perceive as having high risk, but that actually have low real risk, in order to achieve educational objectives (Rawson, 1991). An example of this is a high ropes course element. The participant, unused to such experiences, perceives a high

degree of risk. The instructional staff on the other hand are knowledgeable about safety practices and perceive a low level of risk. Who is right and how these perceptions relate to real risk is explained in relation to figure 3. This is an expanded version of figure 2, further developed to incorporate the elements of risk.

On the right side of the balance is the absolute risk. The absolute risk can be thought of as the "uppermost limits of risk inherent in any situation" (Priest & Baillie, 1987 p. 18). In other words the worst possible losses that could be incurred in an activity if all safety controls were removed. For a high ropes course element the absolute risk is large, as there is the potential to fall and suffer great damage should something go wrong. However, there are safety controls implemented, and the real risk that exists at any time is the actual balance that exists between the interaction of absolute risk, safety controls and instructor judgement. This value can never be known for sure; there is always some uncertainty remaining.

Perceived risk can be thought of as an individuals mental image of how the risk safety meter is balanced at any point in time. For the high ropes course example students are not familiar with the safety controls in place, thus have a perception of the real risk as being very high.

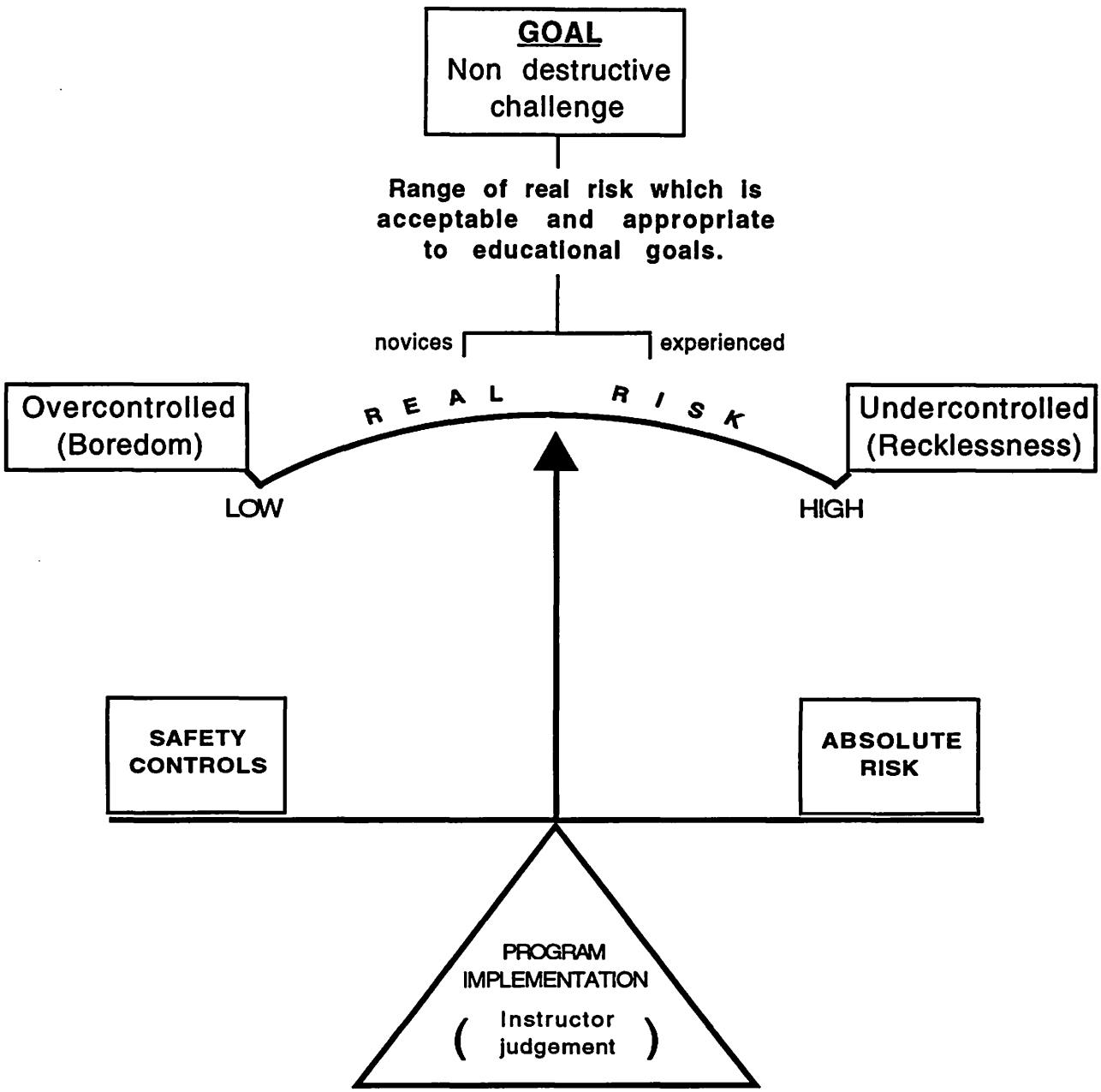

Figure 3: The risk versus safety meter, showing types of risk

Instructors on the other hand, with increased knowledge and experience, have a perception that the real risk is very low. Generally, the students perception is incorrect, and the instructors perception is more astute; after all that is why they are being employed. The danger is when the instructor's perception of the risk is very different from the real risk that exists.

As can be seen from this discussion, the ability to have an accurate perception of the real risk levels depends on having all the necessary information available; and that the information is correct. The students perception of the real risk is generally high because they lack information of the safety controls and they lack trust in the controls. Instructors' perceptions of the real risk should be more astute as they have the skills, experience, and knowledge to make an accurate assessment. However, over time instructors can be desensitized to certain commonly used risk situations and no longer seek the information they should, leading to an inadequate amount of knowledge to accurately perceive the real risk. Any time there is a misperception it can be dangerous.

The question also arises as to how much real risk is required. The answer, as shown in figure 3, is a suitable amount to achieve educational goals in a nondestructive way. For novices, whose perception of the risk

is higher, real risk can be reduced: ropes courses, abseiling/rappeling, flat water kayaking, etc. are good examples of activities that have lower real risk. For adults progressing along a course of skill development, the level of real risk must be higher, and this must be managed in different ways. This concept of various risk levels being appropriate for different types of participants is echoed by Ewert in his model of risk recreation participation shown in figure 4 (Ewert & Hollenhorst, 1989a p.136).

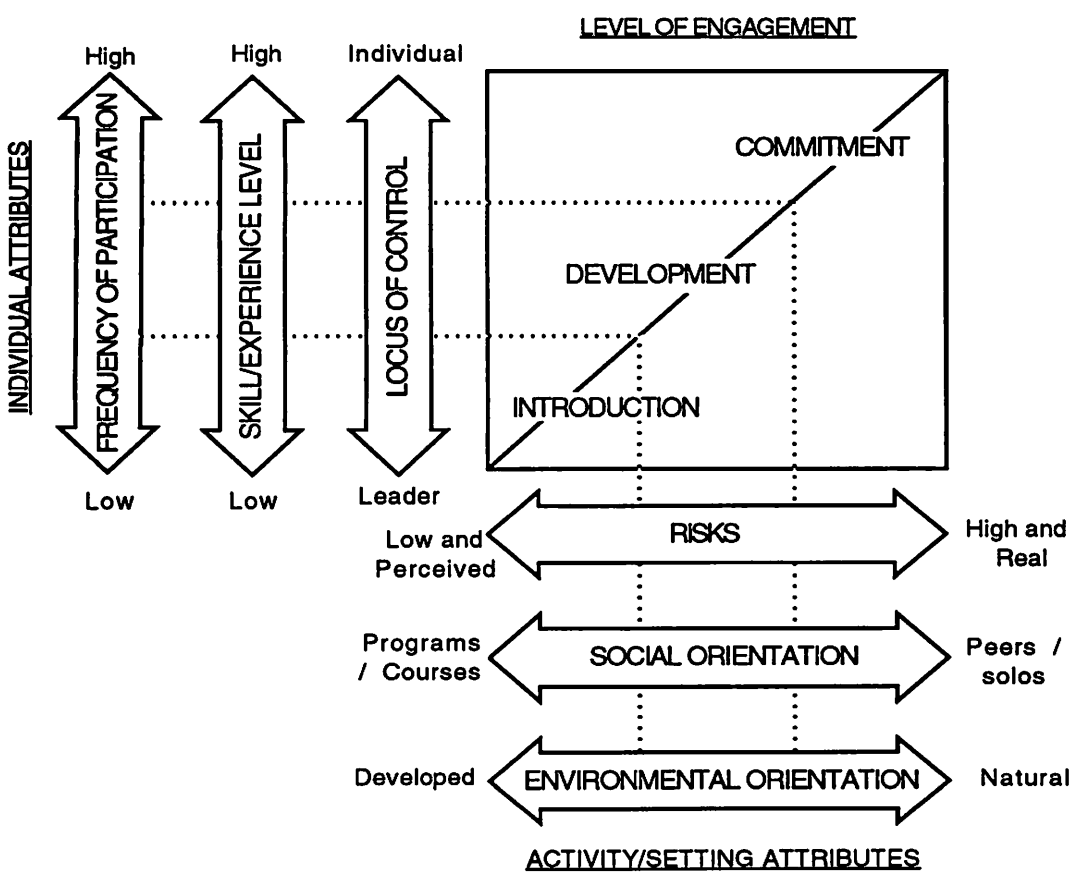

Figure 4: Adventure recreation: a revised conceptual model
(Ewert, 1989, p. 136)

There needs to be a practical way for outdoor center directors to evaluate how successfully their efforts are at providing an appropriate level of real risk in all their activities; how well balanced the meter is. It is relatively easy to measure if the scale is tipping too far onto the safety side, leading to boredom in the participants; outdoor professionals have several readily available tools: for example they can monitor program enrolment levels, or get feedback from students and staff. The questions for focus are:

a) How can one determine if the scale is tipping too far to the risk side?

b) How can one know if all the necessary safety processes are in place?

c) How can one know if the safety practices are up to contemporary standards?

d) How can one know which of these safety practices need more attention and which systems are strong?

e) How can one be sure that the instructors implementing the program are exhibiting sound judgement?

The unacceptable method of finding out the answers to these questions is the early morning phone call that notifies of an accident or fatality, and wakes up the organization to a problem that exists within it. What is needed is a preemptive diagnostic tool.

It should be remembered that while such a tool will act to provide the organization with better information, and therefore a better assessment of real risk levels operating within that organization's programs, such a tool will never remove all uncertainty surrounding the potential for losses. The information is always changing and can never be known completely by everyone at all times. For this reason there will still be losses, as there are in the process of everyday life. However, it is the responsibility of professional adventure educators to reduce this level of uncertainty as much as possible, by using all ways that are available. A diagnostic preemptive tool would be a powerful aid in this task.

Auditing as a diagnostic preemptive tool.

Financial systems are checked for correctness and completeness by having an audit done. An audit is, " . . . an examination of all records, accounts or procedures carried out by a person trained in such examinations" (Clark & Gottfried, 1957 p. 23 - 24). Surely then outdoor centers should carry out a safety audit.

The key to this solution however is in finding an 'examination' to carry out and a person trained in that examination to make it valid. Using the Outdoor Pursuits Center of New Zealand (OPCNZ) as a model, the author will develop a case study of this problem.

The Outdoor Pursuits Center of New Zealand has built into its safety policies a biennial external audit. An outside expert(s) is invited to carry out this audit. In 1991 the director invited an expert in outdoor education, Mr C. Knol of the Hillary Commission for Sports and Leisure to audit the center safety systems and their implementation to the field. Knol's response was astute: "What do you want audited and in relation to what?" The director's own question had been thrown back at him.

Progress was made however when Knol obtained a copy of an industrial safety audit. The director, his safety officer and Knol together changed this to make it applicable to the outdoor situation. The result when applied to the outdoor center showed deficiencies in some safety systems while reinforcing the use of others (Knol, Davidson, & Holding, 1991).

Statement of the Problem:

The questions that arose are; If a thorough research was done of industrial auditing systems, safety management theory, adventure education review systems and legal principles relating to adventure education, could a generic safety audit be generated? Could this be written so that it could apply to any outdoor center? Could it be written

in such a way that it would allow the staff at that center to identify needs in safety management and guide them towards developing a better safety plan?

The concept of using the knowledge contained within these other industries makes sense because the safety management industry, the legal profession, and insurance companies have been dealing with the same issues, applied to much larger businesses, for decades.

Research Question:

Is it possible to generate a generic safety audit based on techniques used in other industry? Can this audit be applied to any outdoor center allowing its staff to identify needs in safety management and guide progress towards a better safety plan?

Importance of the Question:

Adventure educators stand precariously balanced, trying to find the right balance between safety and risk. The cost of an incorrect decision could be the life of a participant, or the loss of the organization, in the extreme. There are other costs even with smaller injuries. Mobley lists many costs of accidents under headings of personnel, equipment and material, corrective actions, legal and insurance fees, prestige, confidence and morale (Mobley, 1981 p.66 - 67). The implementation of a

thorough safety auditing system could go a long way to identifying the risks, and putting into place preventative actions before they happen.

This question is of growing importance considering the growth of the recreational and adventure education industries (Ewert & Hollenhorst, 1990; Mobley, 1981), and lack of safety management skills which the author believes exists within the administrations of those industries.

As Ewert stated in 1984,

> "Perhaps the time is right for all professional organizations concerned with adventure activities to support the concept of risk management in society and our educational system" (Ewert, 1984b p.32).

Definitions of Terms:

A. Nominal Definitions:

The following are definitions of terms pertinent to this study. Their definitions are based upon the work of recognized experts in the fields of adventure education and safety management.

Accident: An undesired event which results in injury, damage or loss. (Kauffman, 1989)

Near Miss: An undesired event that, under slightly different circumstances could have resulted in personal harm, property damage, or loss. (3M, 1991)

Risk: The potential to lose something of value. (Priest & Baillie, 1987)

Absolute risk / competence: Uppermost limits of risk inherent in a situation and the greatest competence the individual could possibly muster in response.(Priest & Baillie, 1987)

Perceived risk / competence: Estimates by the participants involved in the adventure experience of their limits.(Priest & Baillie, 1987)

Real risk / competence: The amounts of risk and competence which actually occur at a given moment in time. They arise from the interaction of individual and setting as a manifestation of absolute values.(Priest & Baillie, 1987)

Danger: Threat of injury or property damage. A popular expression covering the subjective perception of hazard or risk. (3M, 1991)

or, two components of danger are:

Peril: Is the source of the loss.

Hazard: Is a condition that increases the likelihood of loss. Can be either physical / environmental or human. (Mobley, 1981)

Safety: Those collective procedures utilized to keep risks and losses within an acceptable range. (Priest & Dixon, 1990)

or, Freedom from danger, risk or injury. (1985, American Heritage Dictionary)

Adventure: Is an experience where the outcome is uncertain. Uncertainty is present because information important to resolving the uncertainty may be missing, vague or unknown. (Priest & Dixon, 1990)

Challenge: Is present when personal competence is engaged as a means to resolve the uncertainty. (Priest & Dixon, 1990)

Safety Audit: It is an in-depth analysis of the facilities, the management and employee attitudes towards safety, the managerial effectiveness in maintaining safety and the quality of the safety planning as well as the operations conformity with safety

regulations. (Grimaldi & Simonds, 1984)

Loss Control: Describes a program designed to minimize accident-based financial losses. (3M, 1991)

Risk Management: The professional assessment of all loss potentials in an organizations structure and operations, leading to the establishment and the administration of a comprehensive loss control program. (3M, 1991)

Safety Management: The planning, organizing, directing, and controlling of those activities necessary to achieve an organization loss prevention and loss control objectives. (3M, 1991)

B. Operational Definitions.

The following terms are defined as follows for the purpose of this paper:

Auditor: An expert in the professional field who is invited to audit an organization.

Professional Assessment Audit: The auditors are given little or no guidance on what areas to look at and the content of the audit is left to their discretion.

Written Protocol Audit: The auditors are given a written list of guidelines, under category headings, by which to follow to complete

the audit. These guidelines or protocols are generally in the form of open-ended questions, requiring a subjective judgement from the auditors.

Checklist Audit: The auditors are provided with a set list of criteria that they must check as having been met or not met, as is encountered by the auditors.

Graded Checklist Audit: The auditors are provided with a checklist of questions and must choose from a predetermined set of responses. Each response is allotted a set number of points depending on the completeness of the response to the question asked. Each question has the potential to contribute the same number of points to the audit total. The auditor adds the cumulative total and can calculate an average response to summarize the audit.

Graded Checklist With Weighting: The auditor is provided with a graded checklist audit where the question responses have been assigned different values depending on the importance of that topic to the writer of the audit. The audit is summarized by a rating calculated for that category of question so that various categories of safety management can be compared.

Functional Safety: A traditional approach to safety where programs

are run until problems(accidents) occur. The accidents are investigated for the function that failed, and corrected.

Systems Safety: A preemptive approach to safety where a series of analytical tools are used to identify all risks associated with a proposed system, throughout all phases of its life cycle, before the system is put into operation.

CHAPTER II

REVIEW OF LITERATURE

Introduction:

The literature on the management of risk is extensive. The possible danger with any review is heading off on worthwhile tangents, yet never getting to the heart of the research question. For example it would be very easy here to explore the field of safety management, delving into the current thinking of why certain issues are important, or into accident causation theories in adventure education. However the focus with this research are primarily the what and how questions.

This review will be limited to present what the various authors within the safety management industry, and adventure education industry, feel is important to a comprehensive safety management plan, how these subjects might best be audited, and then draw comparisons to conclude:

a) whether a generic safety audit can be constructed on this combined knowledge that will be applicable to the adventure education field, and

b) an appropriate form for such an audit.[1]

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[1] For a review of literature explaining why certain categories were included in the audit, refer to Chapter II of the audit manual in Appendix A of this study; Theoretical Basis for the Audit.

Industrial Safety Management:

There have been major changes within the safety industry since it's beginnings early this century. These changes are documented in detail in many books and articles (Heath, 1986; Petersen, 1988; Roland & Moriarty, 1983). To gain an understanding of contemporary thought, and how traditional models fit into the evolution, a brief synopsis of this changing field follows.

Throughout the history of mankind the concept of safety has been an ever-present concern in life. As depicted by Maslow's heirarchy of human needs in Figure 5, safety or self-preservation is one of humankind's primary needs. However the need for physical safety becomes a secondary consideration when the more basic physiological needs exist: the requirements for food and shelter. The situation many found themselves faced with during the industrial revolution in the 1800s was having to work in hazardous environments in order to get the basic food and shelter necessary to sustain life. At the end of the 19th century a large percentage of the work force were still working in environments that were hazardous in order to scrape out an existence.

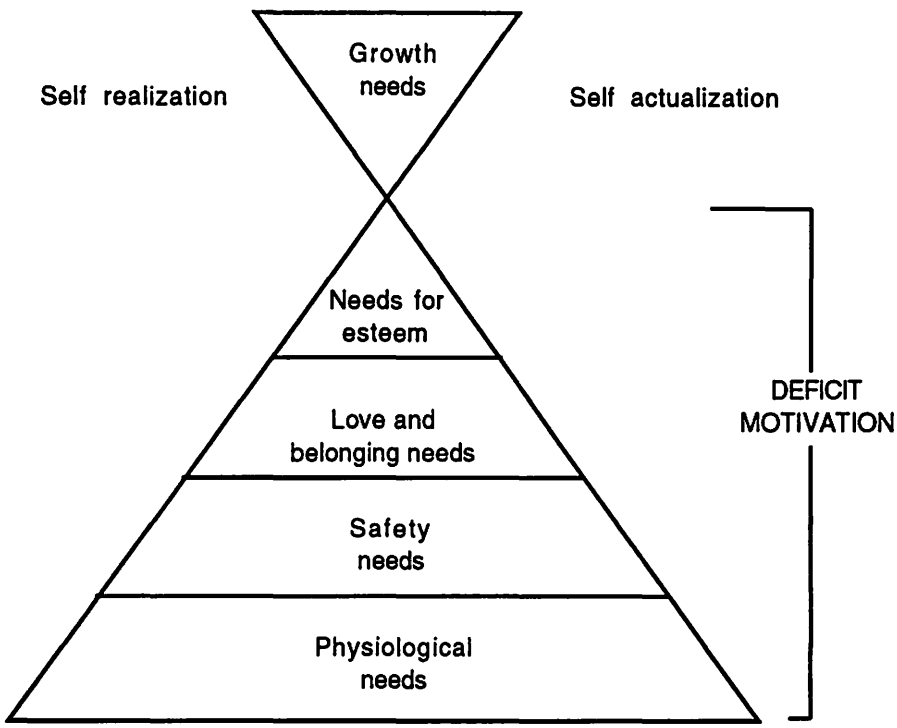

Figure 5: The hierarchy of needs to self-actualization. (Maslow, 1970)

Industry also is concerned with survival; economic survival. At this period there was no motivation for industry to be concerned with worker safety and health other than moral considerations. Those who were injured were considered careless, and occupational disease was not a recognized field of study. There was no economic impact on industry if workers were injured or unhealthy as there was a large labor force and no penalties for contributing to illness or death. This was about to change.

In the early 1900's the number of occupational deaths and injuries was made public in the U.S. by virtue of the Russel Sage Foundation report. This shocked the nation. Compensation laws were passed and National safety organizations formed.

Suddenly there became an economic incentive for industry to be concerned with worker health and safety. The industrial safety age was born. Companies appointed safety officers and safety departments became an integral part of most industry with the role of reducing financial loss due to injury and occupational health problems.

> "The earliest approach to safety was to examine the system during its operational life and correct what were deemed to be unacceptable hazards . . . This concept started with the detailed investigation of accidents . . . to determine cause. Having determined cause, corrective action could be initiated and the system would supposedly have an improved state of safety for the remainder of its service life" (Roland & Moriarty, 1983 p.183).

For the purposes of this paper, the traditional 'fly - fix - fly' approach to safety will be termed <u>functional safety</u>; as it operates by observing the function of a program in failure mode. This approach is represented in figure 6.

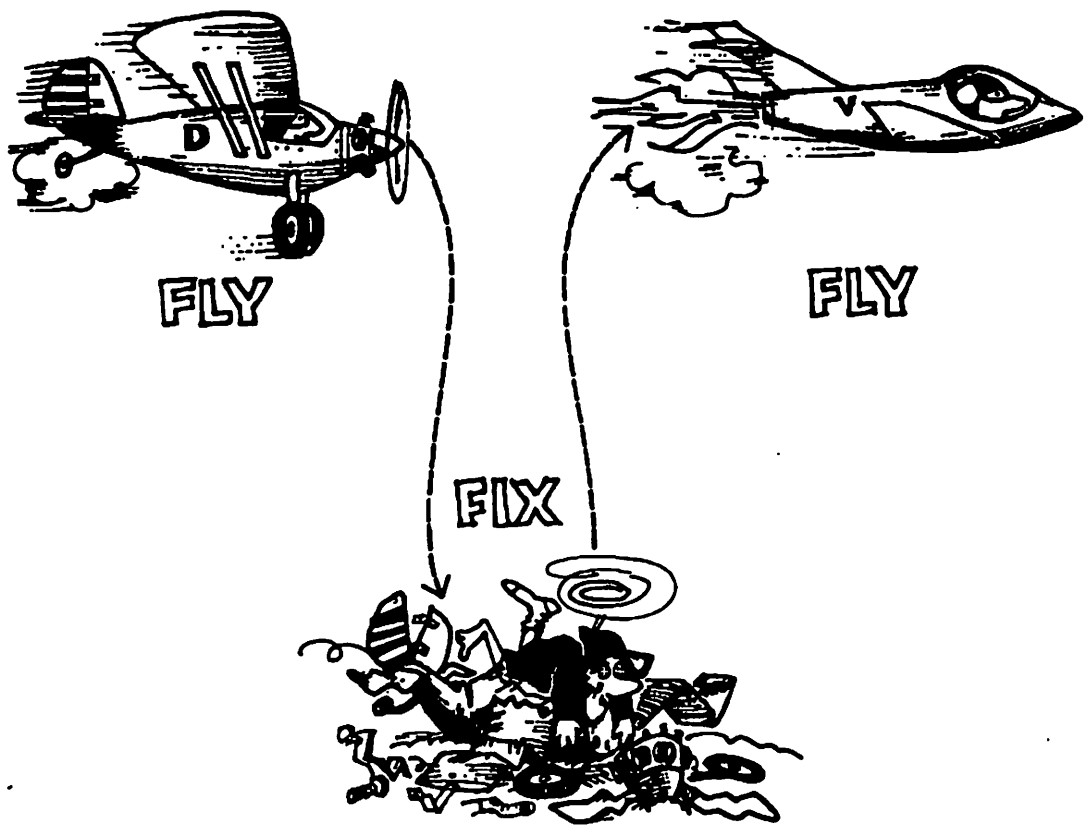

Figure 6: Functional safety: the Fly-Fix-Fly approach. From Roland, 1983, p.10

The 1940's saw management's role in the safety effort identified. This is born out by a quote from Roland P. Blake, then principal safety engineer for the Bureau of Labor Standards in 1941,

> "If really good practice in the elimination of preventable injuries is to be achieved and held in any establishment, top management must apply a good share of its attention to the task, just as it does to any other undertaking of vital importance . . . " (Heath, 1986 p.18).

Rather than simply delegating safety to a department within the industry it was now recognized that safety was the responsibility of all levels within an organization, and the drive for safety needed to be seen to be coming from the very top.

Driven by the insurance industry in the 1960's, the principle of loss control was developed. Loss control departments were concerned with the financial risk management of the company. These risks were not only health and safety risks, but other economic risk situations the company might face. Thus safety management became a component part of the larger concept of risk management, which was controlled by the loss control department through a loss control plan.

The loss control departments began to look for ways that they could analyze an industry for sources of potential loss and once identified, take steps to reduce or eliminate the hazard, or reduce the extent of any loss should an incident occur. As Heinrich's research had suggested, this led increasingly to dealing with people issues as preventative strategies. Issues of training, workload, abilities, ergonomics, etc. were addressed rather than simply inspecting for unsafe conditions. These preventative measures were more expensive to implement in the short term, but over a

period of time were found to be a wise investment.

Another philosophy developed within the broad concept of loss control; quality control. Here the emphasis is placed on quality assurance and hence on " . . . the reduction, elimination and, most importantly prevention of quality deficiencies . . ." (S.A.N.Z., 1987, Part 2 p.5)[2]. This was in contrast to the traditional view held by loss control people where the emphasis was on reducing the impact of a loss should it occur. Quality control as a philosophy has changed and evolved to a much wider, all-embracing concept known as quality systems. Originally quality control was an inspection function, where production items were inspected for quality against standards. This developed to quality assurance, where quality was designed into products, and then to strategic quality management, or a quality systems approach, where quality is seen as a management function. This revolution is impacting business throughout the world and is best evidenced by the international ISO 9000 standards[3] required by many countries to assure quality.

This quality revolution had effects throughout all aspects of industry including the structure of companies. Quality management

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2 Standards Association of New Zealand.

3 International Standards Organization.

models were replacing traditional hierarchical management models. The aim of quality management being the most efficient and economic use of resources. This new management approach uses participative methods involving all people in a company, to make the best use of the potential human resource that the company possesses.

Paralleling these developments were major advances in technology, producing innovations such as nuclear weapons, nuclear power stations, space missions, and large capacity airliners, to name a few. Suddenly the safety management industry was faced with products where the traditional functional safety approach was inappropriate. With these products it was inappropriate to have any failure as the results would be catastrophic. A new approach was developed especially for these types of conditions known as systems safety. This involves a series of analytical tools being used to identify all risks associated with a proposed system, throughout all phases of its life cycle (See Figure 7).

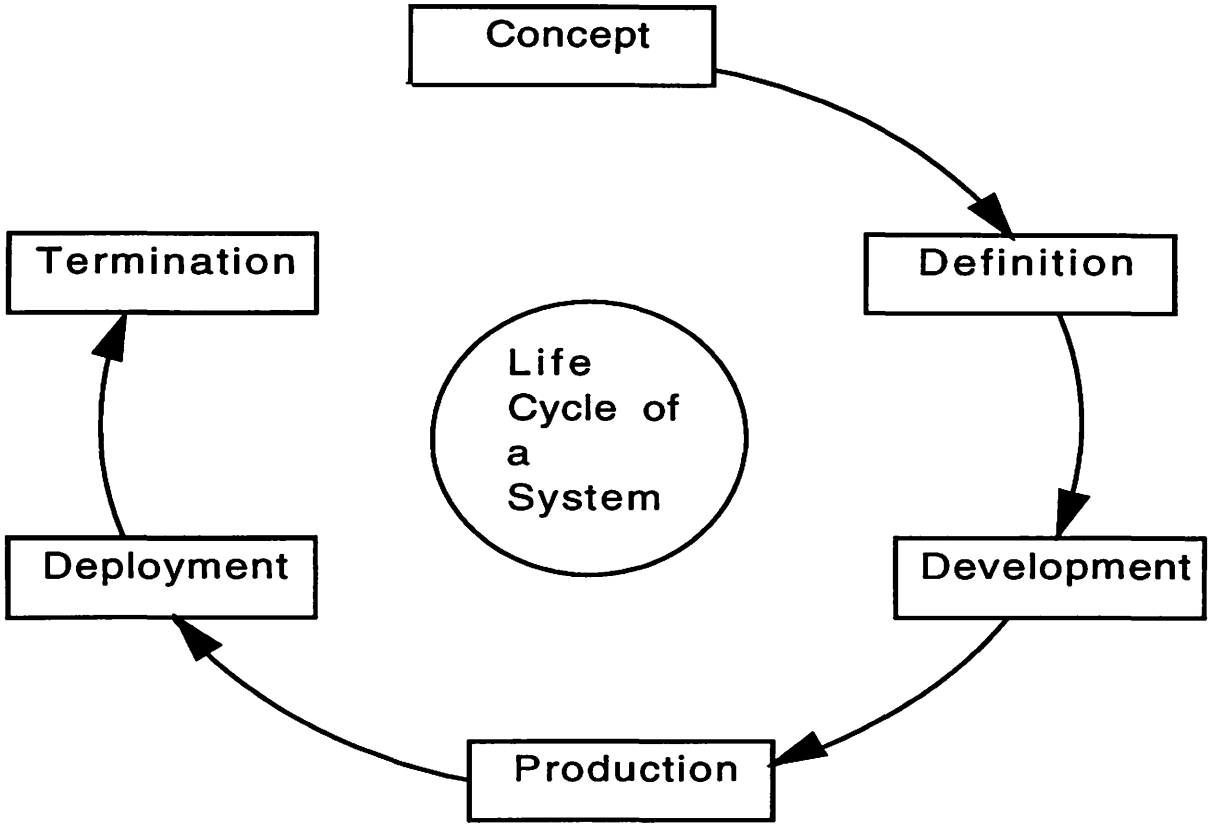


Figure 7: The Life Cycle of a System.

Detection, elimination and control of hazards is accomplished through the use of proved techniques and well-established safety practices. If the hazards cannot be reduced to an acceptable level at planning stage, the project is not continued.

The strength to the systems safety approach is its thorough considerations of all risks before production, including interaction between all components of the system.

> " . . . System safety is concerned with controlling safety while taking other factors into consideration. For example it is frequently necessary to quantify variations in the safety level of a system as a function of defects in design, material and workmanship, human errors of omission and commission, and interfaces of the system with the environment and other equipment over the life of the system" (Roland & Moriarty, 1983 p.14).

While system safety was designed for large industries of complex nature, manufacturing products where failure would mean a large catastrophe, the tools developed such as Preliminary Hazard Analysis (P.H.A.), Fault Tree Analysis (F.T.A.), Failure Modes and Effects Analysis (F.M.E.A.), etc. are finding increasing application to smaller industries. Certainly the concepts of thorough analysis of all possible hazards, and the ability to control them, before implementation is the natural extension of loss control techniques. The power systems safety brings is forcing a close look at the interaction between all components in the system, including the important human error considerations.

A contemporary approach to an organized safety effort can therefore be considered as in Figure 8 .

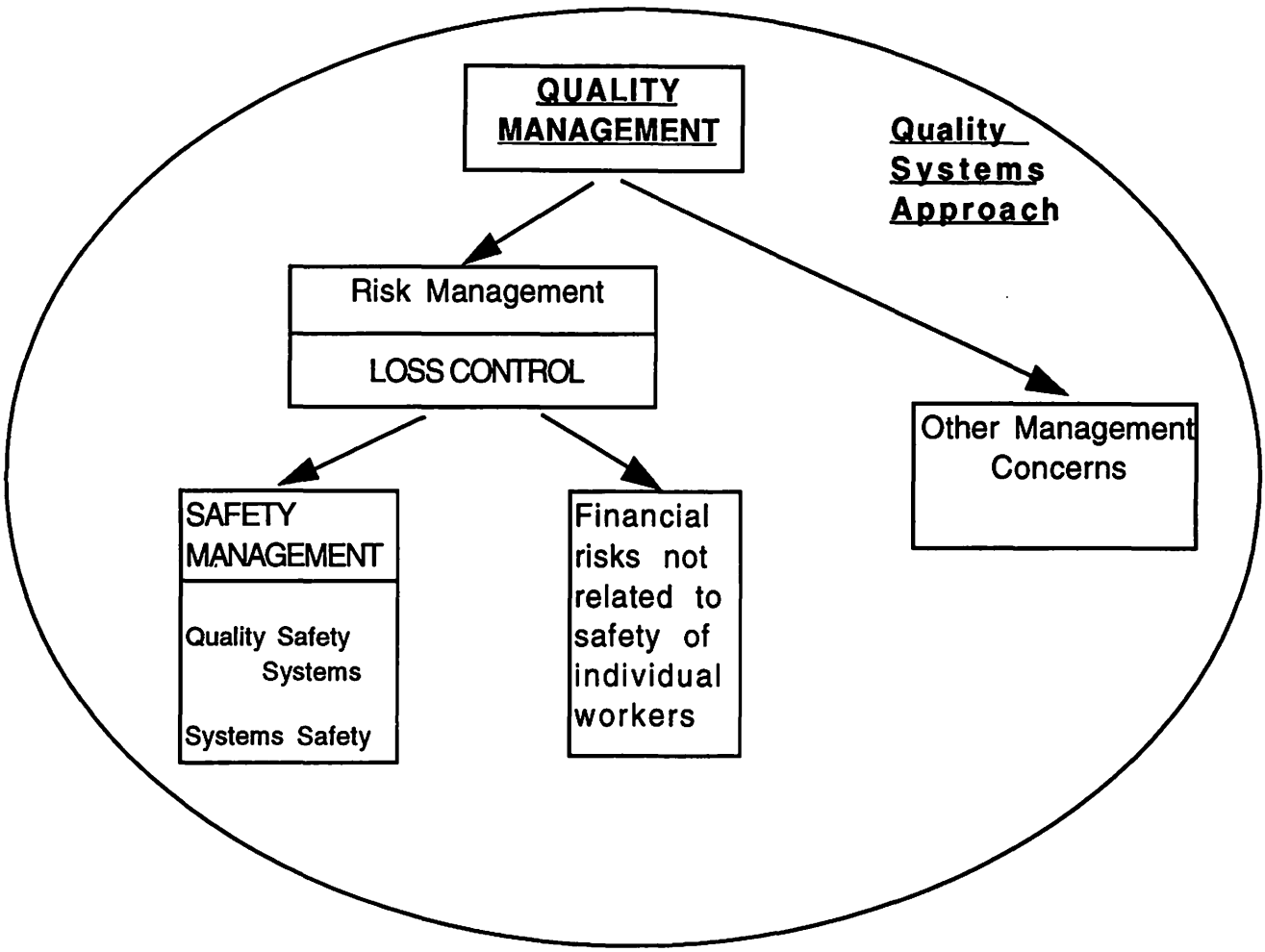


Figure 8: Contemporary Safety Approaches 1992.

The most recent major change in safety legislation, causing increased effort by industry, is the Right-to-Know legislation. This was precipitated by OSHA in late 1983 with the promulgation of the Hazard Communication Standard (29CFR1910.1200). This standard requires that manufacturers and importers label their containers for supplying and

provide a material safety data sheet for all hazardous chemicals. Further it makes employers responsible for maintaining communication programs, to ensure their employees are aware of all the hazards in the workplace. This is in response to the vast and everchanging number of chemicals and substances workers may be exposed to in their daily work. They can no longer be personally expected to keep track of, and be cognizant of, all the dangers they can be exposed to (Asfahl, 1990).

As can be seen by this brief synopsis of the history of safety management, the emphasis has been constantly shifting from the employee being responsible for their safety in the workplace, to a management duty. This is parallelled by development in safety technology to preemptive forms, and management techniques to quality, participative approaches.

Industrial Safety Audits:

A large number of audits exist for use within various industrial settings. In the following section a representative sample of these will be reviewed, classified according to their structure, the differences discussed in terms of advantages and disadvantages.

In discussing the approach of the company Allied Signals to health and safety auditing, Moretz differentiates between three styles of audit (Moretz, 1989). The styles identified are: Professional assessment,

written protocol and checklist auditing. Taking Moretz's terminology as broad classifications for audits, these will be built on as other audits studied become more sophisticated.

For the purpose of this paper the following definitions will apply:

Auditor: An expert in the professional field who is invited to carry out the audit of an organization.

Professional Assessment Audit: Auditors are given little or no guidance on what areas to look at and the content of the audit is left to their discretion.

Written Protocol Audit: The auditors are given a written list of guidelines, under category headings, by which to follow to complete the audit. These guidelines or protocols are generally in the form of open-ended questions, requiring a subjective judgement from the auditors.

Checklist Audit: Here the auditors are provided with a set list of criteria that they must check as having been met or not met, as is encountered by the auditors.

Note that while the first two audit types are qualitative, the checklist type of audit introduces a quantitative format for the first time. With a checklist a comparison can be made between the number of conditions 'met' with the number 'not met'.

Moretz describes the disadvantage of the professional assessment audit as being that the professional may get diverted away from important matters, focussing on something that in his or her view has a higher priority. In the end the auditor doesn't cover the entire scope of the program. He goes on to say that in the other methods the audit team is obliged to follow the protocol and cover every step, even if it looks OK on the surface. Allied Signals uses the written protocol audit system, but keeps its protocols broad-based on purpose because of the companies diversified manufacturing operations.

A) Compliance with regulations:

Almost all employers in the U.S.A. are under the jurisdiction of the Occupational Safety and Health Act (OSHA) of 1970. This requires every employer to provide a work environment that is free from recognized hazards that cause or are likely to cause death or serious physical harm. OSHA publishes standards which consist of rules for avoiding hazards which have been shown to be harmful to personal safety and health. Checking or auditing for compliance can be done in several ways: The National Safety Council (N.S.C.) offer a self-evaluation form, OSHA has local compliance officers who will physically check premises, and there are also published compliance checklists e.g. The OSHA Compliance Manual

(Petersen, 1980), and the National Institute for Occupational Safety and Health (NIOSH) Health and Safety Guides (NIOSH, 1975).

Additionally, many industries must comply with environmental standards established by the E.P.A. Again these are industry specific and many publications are available explaining how to carry out an environmental audit (Cockburn,Boivin, & Gosselin, 1991; Tusa, 1990).

The point to gain from this discussion is that industry will have certain compliance requirements that should be part of the agenda of any audit. These exact requirements will vary from state to state and certainly country to country.

B) Professional assessment audits:

There is little reference to this form of auditing in industrial safety literature. The limitations are so extreme, as has already been pointed out, that this is not considered an appropriate tool.

C) Written protocol audit:

A "comprehensive safety audit" is described by Boley (1977). This audit is composed of 71 broad-based questions which Boley states should be applied to each operational area of an industry by a safety specialist. The audit is not divided into sections but inspection of the audit reveals the following categories of questions:

Question No.	Category:
1 - 4	Follow up of last audit
5 - 12	Accident reporting
13 - 21	Medical screening and facilities
22 - 24	Lock-out and entry permits
25 - 30	Inspection of physical plant
31 - 33	Personal protective equipment
34 - 36	Safety meetings
37 - 38	Supervisory training
39 - 40	Safety involvement by management
41 - 44	Safety record and meetings
45 - 56	Fire prevention
57 - 59	Policies and procedures
60 - 63	Safety training
64 - 69	Compliance
70 - 71	Overall inspection and evaluation

In this audit, no standards are set by which to answer the questions. The questions or protocols are present to point out to the auditor the areas that should be investigated.

Sample question:

#44: Does a new employee's safety training and indoctrination program exist? If yes, is it effective? (Boley, 1977)

D) Checklist Audits:

The Environmental Protection Agency (E.P.A.) publish the, Health and safety audit guidelines. These audit guidelines, and contained audit, " . . . provide step-by-step guidance for assessing preliminary evaluations, health and safety plans (HASP's) and off-site emergency response programs required under the OSHA and EPA worker protection standards... for employees engaged in hazardous waste operations" (EPA, 1989, p.1).

This format gives the auditor a brief paragraph explaining the reason for the question(s) in that section. The auditor is then led through a series of closed questions. Each question has an option of being answered Yes or No. If a 'No' is given then space is provided to describe the apparent deficiency. Additional space follows each section to formulate *any other* questions that might arise, and/or comments, on a given subject area. This allows for differences between industries, not catered for in the overall generic nature of the audit:

The audit is divided into four sections:

1) Preliminary evaluation
2) Written health and safety plan review
3) Health and safety field review
4) Emergency response review

Sections 1, 2 and 4 take place off-site. Section 3 takes place on-site and is a verification of procedures and practices.

Disregarding topics specific to hazardous waste control, the categories covered by the audit are:

Supervision
Employee training
Personal protective equipment
Policies and procedures
Emergency response
Medical surveillance

Each section finishes with a summary of responses: i.e. how many

'Yes' and how many 'No' responses were obtained for each section. This summary, ". . . permits easy tabulation . . . which indicates potential problems and alerts on-site employees to areas requiring additional work" (EPA, 1989, p.2).

Sample questions:

4.3 Training - 29 CFR 1910.120(e)

Training is required for all employees who engage in hazardous waste field activities. These requirements include initial off-site health and safety training, supervised on-the-job training, and annual health and safety refresher training.

On-site managers or supervisors with direct responsibility for supervision of employees engaged in hazardous waste operations require additional training. To determine field compliance with training requirements, the users should interview employees, request documentation from employees and/or their home office, and determine employee efficiency through observation and requests of employees to demonstrate proficiency.

4.3.1 Do all employees working on-site have documentation available to indicate initial health and safety training?
(YES) (NO, EXPLAIN)

Field Verification 1._____ 2._____ 3._____

4.3.2 Do all employees working on-site have documentation available which meets the on-the-job training requirements for 29 CFR 1910-120(e)?
(YES) (NO, EXPLAIN)

Field Verification 1._____ 2._____ 3._____

etc . . . (EPA, 1989, p.29).

Industrial hygiene program self-appraisal quality control checklist (Clayton & Clayton, 1978). This is described as a standard quality program audit adapted to the needs of the analytical laboratory. It consists of 34 questions. This checklist audit differs in that each question has a choice of three graded responses. Each level of response is explained and awarded a number of points dependent on its completeness or acceptability as a solution to the posed need.

Sample question:

28. Training of new employees is accomplished by:

a. A programmed system of training where elements of training, including quality standards, are incorporated in a training checklist; the employee's work is immediately rechecked by supervisors for errors or defects, and the information is fed back instantaneously for corrective action. 5

b. On-the-job training by the supervisor, who gives an overview of quality standards; details of quality standards are learned as normal results are fed back to the employee. 3

c. On-the-job learning, with training on the rudiments of the job by senior co-workers. 1

(Clayton & Clayton, 1978, p.1255)

For each of the 34 questions the same point system is used. This allows the auditor to summarize the entire audit with one figure: the average response score. ". . . a standard of 3.8 average score is acceptable. An average score of 2.5 to 3.7 indicated a need for improvement. It was felt that an average score of less than 2.5 indicated

a risky situation, requiring immediate correction" (Clayton & Clayton, 1978, p.1249). In addition to the average score, the auditor fills in a summary outlining strong points, weak points and improvement goals.

The form of audit described above does not fit any of the previous definitions. For the purpose of this paper it will be named and defined as: Graded Checklist Audit: The auditor is provided with a checklist of questions and must choose from a predetermined set of responses. Each response is allotted a set number of points depending on the completeness of the response to the question asked. Each question has the potential to contribute the same number of points. The auditor adds the cumulative total for all questions and can calculate an average response to summarize the audit.

The author sees the 'graded checklist audit' as an attempt to reduce the subjectivity of the auditor, by providing a standard scale of responses that can be interpreted equally well by anyone conducting the audit. In this way any industry can better monitor improvement, or lack of, knowing changes in score are unlikely to be due to interpretation by different auditors.

The 'cost' of this increased objectivity appears to be the broad nature of the questions in order to keep the responses applicable to a wide

range of industry. If the questions were more detailed the response categories would become industry specific. The value of summarizing an audit in a single figure is questionable. This figure says little about where the strengths and needs for improvement lie.

A further variation on this type of checklist audit is provided by Diekemper and Spartz's, **A quantitative and qualitative measurement of industrial safety activities** (Petersen, 1980). Diekemper and Spartz concur with the use of more objective criteria by saying, "We must use the same 'yardstick' and use it the same way each time an evaluation or measurement is made" (Petersen, 1980 p.63). These two recognize the difficulty in converting the meaning of audit results and the personal knowledge gained by the auditor into concrete terms to inform management. They recognize the importance of measuring the safety activity as well as the results. They produced an audit where the response categories do not have the same point value for each question. In their audit the questions are weighted, where the values incorporated into the measurement device " . . . realistically reflect the degree of importance placed by management . . . " on them (Petersen, 1980 p.63).

They use the broad categories of :

1) Organization and administration.
2) Industrial hazard control
3) Fire control and industrial hygiene
4) Supervisory participation, motivation and training
5) Accident investigation, statistics and reporting procedures.

Sample question:

D. SUPERVISORY PARTICIPATION, MOTIVATION AND TRAINING

	Poor	Fair	Good	Excellent	Comments
1. Line supervisor safety training.	0	10	22	25	
2. Indoctrination of new employees.	0	1	5	10	
3. Job hazard analysis.	0	2	8	10	
4. Training for specialized operations.	0	2	7	10	
5. Internal self-inspection.	0	5	14	5	
6. Safety promotion and publicity.	0	1	4	5	
7. Employee / supervisor contact and communication.	0	5	20	25	

Total value of circled numbers ___ +___ +___ +___ x .20

Rating_____

Where definitions are given separately e.g.

D. SUPERVISORY PARTICIPATION, MOTIVATION AND TRAINING

Activity	Poor	Fair	Good	Excellent
1. Line supervisor safety training.	All supervisors have not received basic safety training	All shop supervisors have received some safety training	All supervisors participate in division training session a minimum of twice a year.	In addition, specialized sessions conducted on safety specific problems.

etc. . . . .

(Petersen, 1980 p.66 - 67)

Each of the five categories is totalled, as shown above for sample section D, and a rating is calculated for that section. In this way the audit can be summarized by five figures which are comparable. Using this management can quickly identify which categories they are doing well in and those they are doing less well in. For more detail the auditor would write a report based on the comments made during the course of the audit.

The form of audit described above is outside the previous definitions. For the purpose of this paper it will be named and defined as: Graded checklist with weighting: The auditor is provided with a graded checklist audit where the question responses have been assigned different point values depending on the importance that topic has to the writer of the audit. The audit is summarized by a rating calculated for that category of question, so that various categories of safety management can be compared.

Another example of a 'graded checklist with weighting' is the **Mine profile rating system** (Petersen, 1980). This audit is divided into three main parts each assigned a number of points:

1)	Incident frequency rate	200 points
2)	Compliance with regulations	300 points
3)	Safety and health program	500 points

Thus the safety manager who designed this audit wants to be able to

compare these three components of the program individually, but also come up with a single figure audited value for the mine where the three components to the audit are weighted by the ratio 2 : 3 : 5.

Individual questions within each of the three main parts are also weighted to contribute towards the final score for the section. The Safety and health program has subsections with categories:

A.	Safety and health management.	55	points
B.	Management training	40	"
C.	Accident Investigation	60	"
D.	Inspection	35	"
E.	Job safety analysis	40	"
F.	Job observation	35	"
G.	Work place design	30	"
H.	Personnel protection	15	"
I.	Maintenance	40	"
J.	Employee placement	40	"
K.	Employee training	30	"
L.	Rules	30	"
M.	Safety communications	30	"
N.	Promotion	20	"

This is followed by a list of instructions and explanations for the person conducting the audit.

3M is a large international company and its Corporate Safety Operations Department (C.S.O.D.) has developed an audit that it believes can be used at any of its branches worldwide: **Self-evaluation of safety facilities** (3M, 1991). They have used a 'graded checklist with

weighting audit' but in a different way than other audits reviewed.

The C.S.O.D. first itemized 16 elements that it considered were the minimum requirements for an effective safety program. It then broke this down further to represent each element by a series of questions and these questions were weighted for importance. The questions were made as detailed as possible to cover all important points and phrased to provide a simple Yes or No answer. Realizing the variations that might occur from country to country the designers have allowed an auditor to rate a question as not applicable. This is catered for in reporting by presenting the results for each section as a percentage of total possible points. Thus this audit allows progress in 16 key areas to be compared from audit to audit and the possibility of a single figure, total percentage, to represent the entire audit if required.

The questions do not have objective lists of graded responses from which to choose answers, and it is suspected that this is a compromise to keep the questions detailed and applicable to as wide a user group as possible by using the subjective judgement of the auditor at each location.

Sample question:

Note: If a question does not apply to your situation, eliminate it and subtract the available points for the question from the total for the element. The new total is the "Adjusted Points Available" to be used in score calculation.

ELEMENT 7. SAFETY ORIENTATION / TRAINING PROGRAM.
(Possible points: 435)

	Questions	Available points		Points:
7.1	Is there a comprehensive listing of the safety training required to enable an employee to perform his/her job properly?	Yes/No	25	_____
7.2	Do all new employees or employees transferring to different jobs receive initial safety training?	Yes/No	35	_____
.				
.				
.				
7.7	How soon after a job assignment is the safety and health / loss prevention orientation given to new management?			
	- During the first week? (15)			
	- During the first month? (10)			
	- During the first 3 months? (5)		15	_____
.				
.				
.				
7.12	Are supervisors and key employees trained in:			
	- The use of appropriate personal protective equipment?	Yes/No	5	_____
	- Entering into confined spaces?	Yes/No	5	_____
	- Lock out and tag out procedures?	Yes/No	5	_____
	- Proper use of open flame and spark hazard permit?	Yes/No	5	_____
	- Use of material safety data sheets?	Yes/No	5	_____
	- Handling hazardous materials?	Yes/No	5	_____
.				
.				
.	Total available points.....435			
	Total adjusted points available.....___			_____

Score: Total Achieved Points _____
Total Adjusted Points Available X 100 = _____%

As can be seen this format has a range of options in which to pose questions and a range of ways of reporting the results. The C.S.O.D. state that "There are three major methods of checking the actual existence and effectiveness of the program activities:

1) Record checks

2) On-site interviews with all levels of employees

3) Physical conditions sampling" (3M, 1991 p.2).

The sixteen elements considered as minimum requirements for an effective safety program are:

1. Safety performance included in all performance appraisals
2. Active safety committee
3. Comprehensive safety program documented and communicated
4. Designated safety coordinator
5. Accident reporting and record keeping, investigation & follow up
6. Timely and effective near miss / potential hazard investigation
7. Safety orientation / training
8. Monthly safety surveys
9. Monthly crew / department / staff meetings
10. Personal protective equipment
11. Contractor safety program
12. Emergency response plans
13. Job safety analysis
14. Process safety management and reviews
15. Operational safety procedures
16. Engineering standards and reviews

The Accident Compensation Corporation of New Zealand (ACC) has

developed a generic audit that can be applied to any organization: **Basic Programme Audit** (ACC, 1985). This is similar to the 3M audit except for one important difference; questions within categories can be scored in two separate ways. Some questions allow for a simple scoring system where either all the points are awarded if the criteria are met, or no points are awarded if the criteria is not met. e.g.

> Has one person been designated as safety and health/loss control coordinator? (XO-30) (ACC, 1985 p.1).

Other questions however allow for a degree of completion or compliance. In this case the auditor is given the ability to use their professional judgement to award points up to those allocated for the question, depending on the level of completion or compliance seen to be existing within the organization audited. e.g.

> Does the organization have copies of all relevant legislation, codes of practice, and related standards? (PJ-25) (ACC, 1985 p.2)

This system allows for questions which can be applied across a range of cultures and interpreted appropriately by trained auditors operating in that culture.

Industrial safety research:

Many important pieces of research have been carried out that produce a better picture of what is important to cover in a safety management program. The review will be limited to the major research applicable to the study.

In 1931 Heinrich reported on his now famous study of over 5000 accidents in the first edition of his book, Industrial accident prevention: a scientific approach. This study established a ratio of 300 : 29 : 1 of no-injury accidents : minor injuries : major injuries. This showed for the first time that investigation of near-misses could show trends which, when analyzed, would lead to the prevention of major accidents. Heinrich also reports on the results of further research where 75,000 individual accidents were analyzed for cause. The results showed that:

2% ARE UNPREVENTABLE
50% ARE PRACTICABLY PREVENTABLE
98% ARE OF A PREVENTABLE TYPE

Of the 98% of preventable accidents, 10% were found to be due to unsafe mechanical or physical conditions, and the remaining 88% were due to unsafe acts of persons. This pointed out to Heinrich the importance of the human factor in accident prevention, and that inspection for the unsafe practices and conditions underlying even the no-injury accidents, would

lead to the reduction and possible elimination of all accidents and injuries (Heinrich, 1959).

In 1967 Planek, Driessen and Vilardo carried out research to determine general and specific factors considered most important to the functioning of a comprehensive industrial safety program. They compiled a list of 78 activities in 8 program areas by consulting literature covering safety program implementation, corporation safety programs and earlier questionnaires. Their 78 items focussed on factors that were general enough to be independent of particular industrial products, processes or philosophies. They then asked 148 experts in industrial safety to rate each activity for importance. 100 were returned in usable form. The results gave a rank order of the 78 safety activities. From this the researchers produced rank orders in the 8 safety program areas and the three top-rated activities in each area.

THE THREE TOP-RATED ACTIVITIES IN EACH OF THE MAJOR PROGRAM AREAS:

Supervisory Participation.
- Enforcing safe job procedures
- Setting an example by safe behavior
- Training new or transferred employees in safe job procedures

Middle Management Participation.
- Setting an example by behavior in accord with safety regulations
- Restating management's position on safety
- Using safety as a measure of management capability

Top Management Participation.
- Setting an example by behavior in accord with safety regulations
- Assigning someone to coordinate safety on a full or part time basis
- Publishing a policy expressing management's attitude on safety

Engineering, Inspection, Maintenance.
- Specifying guards on machinery before it is purchased
- Setting up a formal lockout procedure
- Establishing a system of preventive maintenance for tools, machinery, plant, etc.
- Inspecting tools and equipment periodically

Screening and Training of Employees.
- Making safety a part of every new employee's orientation
- Including safety in supervisory training courses
- Including safety requirements in job procedures based on job safety analysis

Coordination by Safety Personnel.
- Advising management in the formulation of safety policy
- Analyzing the safety program to determine its effectiveness
- Assisting and advising other departments on various safety-related matters

Forming a Record Keeping System.
- Requiring the department supervisor to conduct investigation of disabling injuries
- Using a standardized injury investigation form
- Including recommendations in injury statistics reports

Motivational and Educational Techniques.
- Providing for the employees a list of general safety rules
- Establishing a procedure for disciplining violators of safety rules
- Holding work place safety meetings

(Planek,Driessen, & Vilardo, 1967)

Shafai-Sahrai's 1973 study of the determinants of occupational injury experience produced some relevant results. Shafai-Sahrai studied eleven matched pairs of companies in the Michigan area, where each matched pair consisted of a company having a high injury rate and a company with a low injury rate. All of the companies studied were in the category of small business, where a large business is defined as having greater than 500 employees. Small businesses were studied because research had revealed that the safety records of large businesses were up to four times better on average than for small businesses (Shafai-Sahrai, 1973, p.21-22). The reasons for this have been attributed to many factors. " . . . one of the most comprehensive listings of the factors . . . is provided by the U.S. government publication Safety Subjects . . .

a. Small firms cannot (or do not) employ full-time safety personnel.
b. The executive of a small business carries a complex load and has no technical staff to assist him (sic).
c. He (sic) rarely joins any safety organization or attends any safety meetings or conferences.
d. Costs of accidents are not known because small firms do not have detailed cost accounting systems.
e. As there are few employees, the accident rates must be extraordinarily bad to yield a flow of injuries sufficient to arouse a management immersed in its manifold problems of sales, finance, and production.
f. Small companies usually cannot afford expenditures for which immediate and prompt return is not highly expected.
g. Small businesses are so great in number that it is impractical to communicate the 'gospel of safety' to them by using the promotional methods that have been so widely and effectively used with employers in large companies.

Most of the above-mentioned factors were confirmed by the findings of

this study . . . " (Shafai-Sahrai, 1973, p.22).

Shafai-Sahrai examined the following factors as being of high significance in the causation of different accident experience. The following summarizes whether they were confirmed as significant at the 0.05 level of significance or not:

Factor	Confirmed	Not Confirmed
Management Related Factors		
Managerial attitude towards safety	√	
Company age		√
First line supervisor's span of control	√	
Accident record keeping procedures	√	
Safety committees		√
Safety rules		√
Recreational programs and facilities	√	
Interest of employee families in overall company programs		√
Plant Related Factors		
Physical working conditions	√	
Quality and quantity of safety and control devices on machinery	√	
Age of machinery and equipment		√
Employee Related Factors		
Marital status of employee	√	
Age of employee	√	
Educational level of employee		√
Length of service of employees	√	

In 1977 Cohen studied forty two matched pairs of companies in Wisconsin. Within the pairs the two companies differed by at least 2:1 in work injury experience. He found that the following factors were more evident in the low accident companies than in their high accident partners, and to be particularly prominent in the record holding establishments:

1) Greater management concern and involvement in safety matters.
2) More open, informal communications between workers and management, and frequent everyday contact between workers and supervisors.
3) Tidier work areas, better ventilation, lighting and noise levels.
4) Work force has more older, married workers with longer job service, less absenteeism and turnover.
5) More regard for the use and effectiveness of measures other than suspensions and dismissals in disciplining violators of safety rules.
6) Greater availability of recreational facilities.
7) Greater efforts made to involve workers families in campaigns promoting safety consciousness.
8) Well defined selection, placement and job advancement proceedings with opportunities for training in developing new skills.

(Cohen, 1977)

Edwards and Hahn reported the results of their research which showed that " . . . workers observed unsafe acts and conditions in the workplace and this correlated 0.61 with accidents. . . . The data suggest that accidents are happening where they have a chance to happen - where

people report the existence of unsafe acts and conditions" (Edwards & Hahn, 1980, p.63). This points out the importance of having hazard reporting forms and letting the staff take part in the safety plan: they know where the hazards are.

Other Safety Management Writings:

A) Categories for inclusion:

Other writings on safety management in the industrial arena can also help to point out activities that should be included in a safety audit. Many of these articles and books stress the value in carrying out an evaluation of the safety program, pointing out that the organization will benefit in various ways such as: confirms success and identifies areas where further work is needed, prevents major injury to employees and surrounding public, the safety of a system can be rationalized, hazards can be identified, and the knowledge that a system is in place to help insure continued compliance with the law and corporate policies (Freeman, 1989; Krivan, 1986; Manuelle, 1980; Moretz, 1989; Van de Putte, 1980).

The following are lists summarizing the categories that various writers have stated as being important components of a safety program:

Management Involvement
Safety administration
Safety committees
Supervisory participation
Selection and training of employees
Preventive maintenance
Human factors / industrial engineering
Control of health hazards
Safety rules
Maintaining interest
Emergency plans
OSHA compliance

(Manuelle, 1980)

Management Leadership
Assignment of responsibility
Maintenance of safe working conditions
Establishment of safety training
Accident record system
Medical and first aid systems
Acceptance of personal responsibility by employees

(Burks, 1986)

Management must desire to prevent every preventable accident
Management must select a competent person to take charge
Management must put safety on the map
Safety engineer must plan and carry out a program for the minimization of hazards
Accident prevention must be incorporated into the work program as a part of routine operations

(Heath, 1986)

Objectives and goals
Documentation of process knowledge
Review of capital project and design procedures
Management of process risk

Management of change
Process and equipment integration
Incident investigation
Training

(Freeman, 1989)

Commitment and policy
Safety committee and coordinator
Safety manual
Inspection
Maintenance
Site development
Site management
Public information and education
Employee training
Research and evaluation.

(Gold, 1991)

Communicate the company safety policy
Seek employee involvement
Establish measurable goals and objectives
Don't hire accident prone people
Investigate all accidents
Develop safe operating procedures

(Bryan, 1990)

Petersen (1980), in talking about analyzing safety systems, provides a checklist with the categories of:

Management Organization
Accountability for safety
Systems to identify problems and hazards
Selection and placement of employees
Training and supervision
Motivation
Accident record and analysis
Medical program

From the lists above, and those contained in the audits that have been reviewed, certain commonalities appear. It is possible to isolate the essential categories that should be contained in any safety audit. This conclusion is shared by Manuelle who states, " Having completed a large number of evaluations . . . in a large variety of industries, it became apparent that there are elements common to all successful hazard control programs, and that exceptionally favorable accident experience could not be achieved unless those elements were well managed" (Manuelle, 1980 p.55). It is then only a matter of deciding what category headings to group the essential elements under.

The actual detail contained under each category heading will be more industry specific. As Petersen (1989) states, ". . . the safety program must be right for the specific organization. What is right and essential at one property is not right and essential at another" (Petersen, 1980 p.27).

B) How to analyze the safety program.

Based on writings and research Petersen (1980) summarized the areas of control that need to be analyzed into three basic categories; the behavioral influences, the safety system, and the physical environment. His model of safety effectiveness is shown in Figure 9.

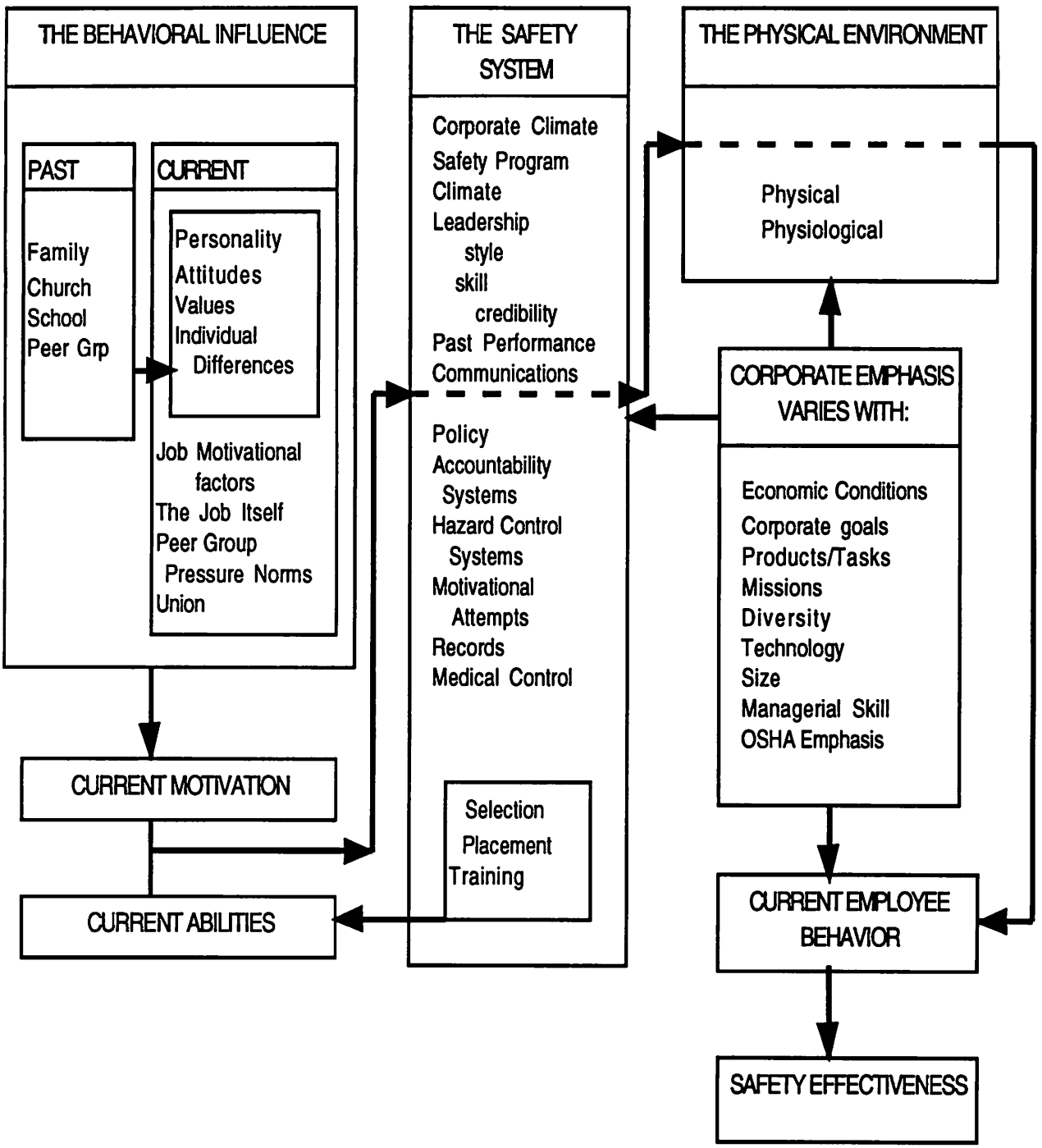


Figure 9: Factors Affecting Safety Effectiveness. (Petersen,1980. p.29)

> "This model is based on a belief that safety effectiveness of an organization is determined primarily by current employee behavior. The current individual employee behavior is based first of all on those items in the behavioral influence category. Our past experience developed our current behavior. That behavior is very much influenced by the current factors noted (job factors and peer factors). The accumulation of these factors determines our current motivation, which, coupled with our ability, determines behavior.
>
> This current behavior is then filtered by the safety system that we have constructed, including all (and more) of the items noted on the chart. This behavior is filtered and influenced further by the physical environment in which the employee works. The result is the current behavior, which determines safety effectiveness. Additionally, the physical environment and the safety system are very much influenced by a number of items which determine the current corporate emphasis as listed on the chart" (Petersen, 1980 p..30).

Petersen wrote about checklist type audits being appropriate to analyze the safety system.

For the physical environment analysis he suggests checklists as an aid to inspection, where checklist items are obtained from job safety analyses (JSA's) and hazard hunts. In a later book he identifies a newer, but similar method known as safety sampling (Petersen, 1988). In this method a code is established of unsafe acts, with possible causes, then an inspector goes into the work place recording safe and unsafe observations of workers. This gives quantitative and qualitative feedback on the physical environment.

For the behavioral influence, Petersen admits that there is almost nothing in safety literature from which to draw. He concludes that probably the best device to analyze and motivate is the interview process. The performance analysis interview is suggested whereby employees are interviewed for performance deficiencies, physical deficiencies, knowledge deficiencies and execution deficiencies.

This opinion and model suggested by Petersen is supported by the thoughts of Manuelle (1980, p.58) who, after completing many evaluations of hazard control programs concluded that ". . . the best approach is to use several measurement systems to evaluate the quality of hazard control management" and Grimaldi & Simonds when talking about measurement say, "The desired results occur through the use of a number of tactics and methods" (Grimaldi & Simonds, 1984 p.79).

C) Different degrees of risk.

In discussing improving conditions, Petersen (1980) wrote about several methods for determining priorities for improvement once hazards have been discovered by the analysis. This same priority system could help in establishing weightings for audit responses. One method suggested for assigning priority is by way of a matrix offsetting degree of hazard against time taken and cost involved. A second is by way of a

mathematical formula where a "risk score" is calculated by multiplying factors:

Risk score = Consequences X Exposure X Probability

It is also possible to take into account the difficulty of the correction and the cost. This is termed a justification factor:

$$\textbf{Justification factor} = \frac{\textbf{Consequences X Exposure X Probability}}{\textbf{Cost factor X Degree of correction}}$$

Van de Putte makes the point that, "Within a safety study, calculation of the consequences of unwanted events plays an important role. In the first place it is possible to make a selection among identified unwanted events by means of calculated consequences. In addition it is true to say that, as the consequences increase in significance, the perception of an unwanted event comes to be determined more by the consequences than by the probability of occurrence and in the case of very great consequences, almost exclusively by the size of the possible consequence" (Van de Putte, 1980 p.233).

This discussion indicates that there are factors an auditor can take into account if wishing to weight response categories, and the most importance of these is consequence.

Summary of Industrial Safety Management:

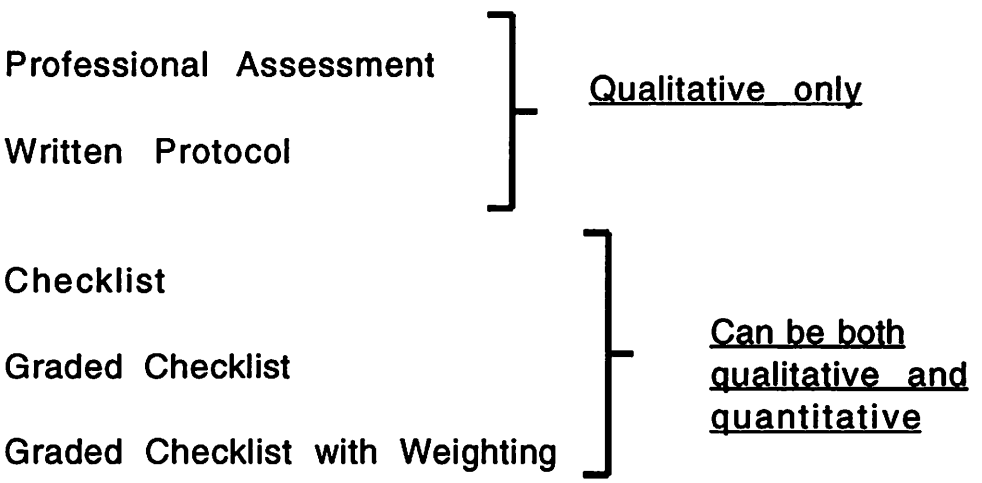
This review of industrial safety literature reveals the following main points:

a) Safety management has evolved from the traditional functional safety or 'fly-fix-fly' model, that concentrated on the investigation of accidents and incidents in a reactive way. Modern models of loss control take a pre-emptive approach believing it is more efficient to consider the impact of potential hazards before any system reaches production stage. This new 'systems safety' identifies hazards and then works to ensure the hazards are designed out, reduced in some way or the system is abandoned as being unsafe. Tools have been developed to aid in this pre-emptive approach.

b) The pre-emptive approaches to safety are tied to a quality management model to provide a contemporary safety approach throughout the organization in the 1990's.

c) The use of auditing systems to review safety programs is considered valuable in industry.

d) Studying a range of audits in existence identifies a range of different formats:



The ease of monitoring the measured effectiveness of the safety program increases down the list of audit formats, as we are given the ability to compare quantitative results. In addition the reliability of the results from the audit improves as we go down the list of formats as subjective audits give way to more objective ones. Finally the accuracy of the results increases as weighting is introduced which gives a representative result to the final score dependent on the importance of the question asked.

e) Generic audits are being carried out successfully in large corporations on an international basis.

f) The cost of making an audit generic is a reduction in the specificity of response categories and in the audit format being able to take into account redundancy of some questions, while still remaining valid.

g) The reduction in specificity of questions, necessary to make an audit generic, can be countered by incorporating professional judgement of trained auditors into assigning points for any question. The number of points assigned depending on the degree of compliance sighted in that category.

h) There are common elements that should be included in any safety audit. These common elements would be covered under the broad category headings of:

Organization and administration
Safety systems
Staff selection, training and evaluation
Equipment
Hazard evaluation
Physical plant
Health control and medical facilities
Emergency response

The exact detail contained within each heading depends on the individual industry.

i) It is recognized throughout industry that small businesses have

poorer safety records than large ones. This can be attributed to a range of identified factors relating mostly to lack of resources to be allocated to the safety effort and that a high accident rate is not as obvious in a small worker pool.

j) Modern safety theory is concentrating increasingly on a people approach in the goal of increasing safety.

k) A safety program's effectiveness can be thought of, using Petersen's model, as having three main elements: the behavioral influence, the safety system and the physical environment. To audit a safety program therefore requires the auditing of each of these elements, and each element is best evaluated using different methodology:

Behavioral influence - survey/interview

Safety system - checklist

Physical environment - inspection with criteria (safety sampling)

l) Risks identified in an audit can be rated for priority according to consequence, probability, exposure, cost and degree of correction required.

Adventure Education:

Safety is a continual agenda item for all adventure educators. The following is a summary of their writings in the field of auditing and approaches to safety management.

Adventure Education Reviews, Audits and Checklists:

Many adventure educationalists have recognized the need for some sort of audit of their safety programs, while others have various forms of audit forced upon them by government regulation. The following section looks at a representative sample of audits currently being used; comparing them with the classifications for audit types generated earlier in this paper.

A) Compliance audits:

A number of adventure education providers are inspected by Government agencies to ensure that the organization is meeting its legal requirements regarding health and safety of participants and employees. An example would be that used by the National Centers Board of the British Sports Council (Gilpin, 1991). The items covered in such an audit would depend on the country, state, or local district and the regulations that governed that area. Examples of categories would be:

HEALTH: Food hygiene, water quality, residential dormitory requirements
FIRE SAFETY: extinguishers, smoke doors, detectors, fire drills, egress points
BUILDING INSPECTIONS
HAZARDOUS MATERIALS: storage and handling
VEHICLES: Current legal requirements

These point out areas that should be included in an audit if not already controlled by an external agency as part of normal procedure.

B) Professional assessments:

This is a common technique employed by smaller outdoor centers. Examples are audits carried out on the Outdoor Pursuits Center of New Zealand (Collister, 1987; Holding, 1989). In this system an organization invites a renowned expert to come in and review the safety of the organization. What normally results are some astute comments related to one or more specific aspects of the organization's operation, but no global look at safety management in a structured fashion. There is little to be learnt from this as a system due to it's lack of structure.

C)Written Protocol Audits:

Outward Bound National Office carries out regular (two yearly) reviews of each of its schools. The National Office has published "A guide to conducting safety reviews for assessing and upgrading safety in outdoor adventure programs", with the stated purpose to ". . . assess the

safety management practices and make recommendations for improvement" (Wade & Fischesser, 1988 p.2). This document outlines a suggested process of putting together a review team, conducting the review and report writing, with responsibilities for various members of the gathered team. It also itemizes categories for review, with questions that act as indicators for assessment. The categories covered are:

Participant preparation and screening
Staff hiring training and assessment
Management systems
Program activities
Emergency procedures
Logistics
Physical Plant
Transportation
Manuals, policies and procedures

The document suggests an audit should be carried out at two levels: an in-field component and an administrative or "in-town" review.

The audit does not contain any checklists, does not provide any sort of scoring system, does not weight any aspects of safety higher than others.

The audit does not imply or expect a thorough check of any one or all aspects and so is not as exhaustive as a complete 'written protocol audit' by the definition of this paper.

The final report structure stresses improvements, not mentioning what is being done well.

The Association for Experiential Education is currently investigating the process of accreditation of outdoor programs possibly incorporating the process of peer review. The New England branch of AEE has been running "A pilot model for a New England peer review program" which they believe " . . . promotes program safety, quality, and moral and ethical programming concerns" (Gray, 1990 p.1). This review document is very similar to the structure used by Outward Bound. It describes how to set up the review process and team, suggested areas for inquiry and report writing, including a sample report. The criteria suggested are, to all intents, identical to the Outward Bound list and described as " . . . not meant to be exhaustive" (Gray, 1990 p.13).

All comments made in reference to the Outward Bound Review process could be echoed here.

The National Outdoor Leadership School has a safety and training department which has developed an auditing procedure for its branches. These procedures are " . . . intended as a method to insure systems are functioning optimally, to upgrade systems as needed and to continually enhance the safety consciousness of the school" (NOLS, 1991

p.1).

The audit outlines how to put together the audit team, responsibilities, report writing and procedures. It stipulates an in-field audit where comments should be made by auditors ". . . specifically on the following areas:

Supervision . . .
Evaluation . . .
Paperwork . . .
High risk activities . . .
Technical systems . . .
Equipment . . .
Minimum impact techniques . . .
Quality of instruction . . .
NOLS field safety policies . . .
Attitudes . . .
Field rations . . .
Admission process . . .
Other safety concerns . . .
Expedition behavior . . . " (NOLS, 1991 p.4-5).

This is accompanied by an in-town audit and is " . . . composed mostly of various checklists providing for areas requiring specific comment; however the general impressions of the auditor of the in-town operations are also very important and should be included in the final report" (NOLS, 1991 p.5). The checklists for the in-town audit supplied were:

Course paperwork audit
Instructor file audit
Physical plant audit
Student information and files audit

Evacuation coordinator resources

With this audit can be seen the introduction of checklists to the written protocol system. The checklists are applied to the in-town audit where each system is checked as being either Satisfactory, Needs Improvement or Not Applicable.

D) Checklists:

In a Winston Churchill Fellowship Study, Allan compiled a Checklist for administrators of outdoor programs (Allan, 1983). Within this Allan lists a number of questions that administrators need to ask concerning their outdoor programs under the headings:

Program
Evaluation
Participants
Equipment
Framework
Staff

In the AEE publication, Safety Practices in Adventure Programming, a Safety Review Checklist is included which is an adaptation from the Outward Bound Safety Review Manual already discussed (Priest & Dixon, 1990).

Other Adventure Education Writings:

Many other authors have written, expressing their views on what is crucial to safety practices in the adventure education field. These will be summarized under broad subject headings so that the reader can gain an understanding of what is considered important and, if interested further, is directed to the original articles in the references section.

Trip Planning: "A majority of the accidents that occur with groups in the outdoors are a result of poor planning by the leaders" (Green, 1987 p.401). Green then goes on to expand on what he sees as the major considerations for trip planning under subcategories of: philosophy, site selection, realistic schedules and routes, group policies, safety guidelines, risk management plans, transportation, permits and licensing, food, methods of resupply and emergency procedures.

Near miss and accident investigating: Many writers point out that "Usually accidents are preceded by a series of events which, when viewed in retrospect, form a chain of events that lead quite clearly to the actual accident . . . Near misses are important since they could just as easily result in a serious accident another time" (Kauffman, 1989 p.69). Other writers echo this sentiment (Hale, 1984; Helms, 1983; Meier, 1984; Meyer, 1979; Mobley, 1981; Raffan, 1988; Rawson, 1991).

Staff selection, training and evaluation: Many see this as the fundamental safety consideration, as these people are in the decision-making role and in have the ultimate ability, through judgement and choice, to influence the safety of the client; despite other precautions (Ewert, 1984b; Hunt, 1984; Meyer, 1979; Priest & Dixon, 1990; Udall, 1987). "The single most important criterion in program safety is the quality of training of staff . . . in both program skills and program design" (Prouty, 1986 p.5). We " . . . can still expect accidents because of the judgement error, the limiting human factor presents the biggest challenge to be overcome . . ." (Meier, 1984 p.4).

Emergency planning and preparedness: These help people realize what dimensions of risk exist in all chosen activities and have the skills to safely cope with them if they should occur (Meier, 1984; Raffan, 1988).

Supervision: Appropriate supervision should be planned and used to match the level of activity as well as the age, maturity and experience of the students (Hale, 1984; Meier, 1984; Rawson, 1991).

Equipment, maintenance and inspection: It is important to purchase quality equipment and then have in operation planned regular inspection and maintenance schedules (Meier, 1984; Priest & Dixon, 1990).

Student Selection and Screening: It is considered important to have knowledge of the students before activities: their physical abilities, medical history, special problems, etc (James, 1980; Priest & Dixon, 1990). Udall suggests that " . . . accidents happen to particular students at particular times in predictable situations" (Udall, 1987 p.383-384). He believes it is important for all instructors to do an accident probability assessment of each student by analyzing each student in terms of stamina, grace, strength, agility, mental abilities and medical record.

Administration and organization: "Effective organization is a major contributor to safety in outdoor activities and administrators have a particular and often the initial responsibility" (Rawson, 1991 p.10). Administrative responsibility is seen to include: setting appropriate and achievable objectives, designating responsibilities, selecting appropriate sites and venues, establishing appropriate procedures and regular appraisal and review.

Program policies and guidelines: An organization needs to develop a set of policies and guidelines that are based on legal and morally defensible practices. In addition there needs to be an adequate communication medium of these to all staff. This is seen as 'most critical' to some writers as the importance the organization places on

safety is displayed in these policies and how they are enforced (Hale, 1984; James, 1980; Mobley, 1981; Priest & Dixon, 1990).

Litigation protection and insurance: This is seen as an important responsibility in the risk management plan of any organization to guard against the possibility of a major financial loss through accident or litigation (Hale, 1984; Priest & Dixon, 1990).

Safety reviews: These are seen as necessary in order to determine the status of safety systems within an organization (Hale, 1984; Priest & Dixon, 1990; Schimelpfenig, 1991).

Role clarity: Establishing clearly the roles and responsibilities of all members of the organization in respect to safety (Hale, 1984; Mobley, 1981; Schimelpfenig, 1991; Wade, 1986).

Evaluations: Of staff, programs, safety records, goals, and other organizational parameters (Hale, 1984; Rawson, 1991).

Risk Management:

In 1984, Mobley wrote, "There is much to be gained by examining what people outside the field of adventure education have learned about accidents" (Mobley, 1984a p.11). He and several others were looking closely at the work being done by safety engineers such as Heinrich and by the insurance industry. Mobley studied Heinrich's pyramid of numbers, and

'Domino theory of causation' concluding that, " . . . at the stage of unsafe acts or conditions we can intervene so that a potential accident does not lead to a serious injury" (Mobley, 1984a p.13). What Mobley realized was that in order to stop accidents in adventure education it was necessary to identify all of the unsafe acts or conditions before they could have an effect, and manage them. This is the concept that the insurance industry had been developing in the early 1960's and terming risk management. The insurance companies aim was to reduce the financial loss potential. The " . . . theoretical design of risk management policies was to expect the unexpected . . . if an unplanned event did occur, the negative effect upon current operations would be held to a minimum" (Bruner, 1986 p.139). Bruner continues to say that ". . . risk management requires the analysis and consideration of all aspects of uncertainty, not just financial loss. The concept also refers to the possibility of exposure of persons to injury, danger or loss of life, and the possibility of harm to equipment and physical resources which may increase the possible risk exposure of participants in the activity" (Bruner, 1986 p.139-140). Mobley developed his "buffer-zone" analysis technique from this. "Buffer zones are simply positive ways to answer the question 'What if?' " (Mobley, 1981 p.81).

Meier (1984) used these concepts of risk management and developed

a three phase system of risk management for adventure education. This consisted of:

Step 1. Pre-event Phase: Before the activity identify all the risks possible based on prior experience.
Step 2. Event Phase: Use strategies to minimize the chance that injury will occur.
Step 3. Post-event Phase: Consider what strategies you could use to reduce the necessary consequences of accidents should they occur, and plan for this.

(Meier, 1984 p.6-8)

In discussing models of safety management, Kauffman pointed out that all of them study ". . . the three same elements but emphasizes different aspects of the Host - Environment - Agent triad (people, environment, machine)" (Kauffman, 1989 p.70). He saw the basic causal factors of accidents to be:

A) HUMAN FAILURES: (approx 80% of accidents)
- psychological factors
- physiological factors
- cultural factors

B) ENVIRONMENTAL HAZARDS: (Approx 15% of accidents)
- Natural factors
- Human factors

C) DEFECTIVE AGENTS: (Approx 5% of accidents)
- Design agents
- Mechanical factors.

The New Zealand Education Outside the Classroom (EOTC) committee took these various ideas and collapsed them into a simple tool for the use

of outdoor educators. They termed this a risk management matrix (EOTC, 1988). See Figure 10.

	PEOPLE	EQUIPMENT	ENVIRONMENT
RISK IDENTIFICATION			
RISK MANAGEMENT			
CRISIS MANAGEMENT			

Figure 10: Risk Management Matrix Developed by the N.Z. E.O.T.C.

This is used before any activity is run. First of all past experience is used to identify all the risks in an activity under the headings of PEOPLE, EQUIPMENT and ENVIRONMENT. Then a decision is made on an appropriate management technique, again based on insurance company principles of Avoid / Transfer / Reduce / Accept. If the decision is made to either accept or reduce the identified risks, the ways planned to do this are written down under the risk management heading. Finally a plan for crises is made, so that if something unexpected does happen all the appropriate systems and resources are in place. This is revised after the activity so that any risks identified during, but not before, can be taken into account in future. An easy tool to use, and a good summary of the other writers' ideas.

Many of adventure educators advocate the necessity of carrying out this risk management analysis of all activities and programs as part of an active safety program.

Severity of Risks in Adventure Programs:

Some authors in the adventure education field differentiate between different degrees of risk. Ewert uses a frequency/severity matrix to divide risks into four categories and uses this as a basis for determining the best management technique for handling the risk. The techniques he

suggests are based on the insurance industry's loss control techniques of avoid / transfer / reduce / accept (Ewert, 1984b). In a later article Ewert looks at how different decision-making modes can be incorporated into those risks you have decided to retain based on three categories; depending on their relative frequency and consequence of the risk if it occurs (Ewert, 1988c). Fink uses a "Crisis Barometer" to rate risks according to impact a crisis would have and probability of it occurring. This analysis allows Fink to classify risks into four broad categories of severity (Fink, 1986).

The important point is that there are different degrees of risk to adventure education which may require an appropriate weighting system to be used in any audit that is quantified.

Adventure educators see people as the key to safety.

"The fulcrum on which balances the paradox of risk and safety lies with the practitioners and their possession of sound judgement" (Priest & Dixon, 1990 p.9).

The clear message throughout adventure education writing is the importance of the instructional staff in the safety effort. No matter what policies, manuals and other elements of the safety program are in existence, they become meaningless instantaneously in the field if an

instructor exhibits bad judgement.

> "We can, and must develop policies and operating procedures that will (1) assure the recognition of and preparedness for unsafe conditions and (2) minimize unsafe acts. Further, even when we have satisfied these two prerequisites, we may still expect accidents including fatal ones. Why? Chiefly because of judgmental errors" (Meyer, 1979 p.12).

> We " . . . can still expect accidents because of judgement error, the limiting human factor that presents the biggest challenge to be overcome" (Meier, 1984 p.4).

In fact many writers are afraid that in the present litigious climate, rules and policies are encroaching too much on the decision-making ability of the instructor in the field who must deal with various situations which are ever changing.

> "The issue is the conflict between rules and instructor judgement as the means to achieve safe adventure courses . . . I am afraid that the rule-based model for making decisions is gaining the upper hand in adventure based programs in the U.S. today. Fear of lawsuits and bad publicity are compelling many program administrators to minimize the amount of freedom provided to their field instructors in order to maximize certainty of results in specific situations" (Hunt, 1984 p.20).

While the writers see people, namely instructional staff, as the key component to safety in an adventure education organization, they also concede that the judgement these people must possess to be safe as being ". . . one of the most difficult competencies to train and assess" (Priest &

Dixon, 1990 p.9).

Adventure educators need to know why!

There is a common thread through the literature that adventure educators need to have an understanding of basic safety practices in order to implement them positively (Kauffman, 1989; Meier, 1984). This makes good sense in terms of intrinsic versus extrinsic motivation for a safety program. It is not enough to have an audit that simply points out that your organization should be more proactive in various areas of its safety plan, without educating those people as to why.

Summary:

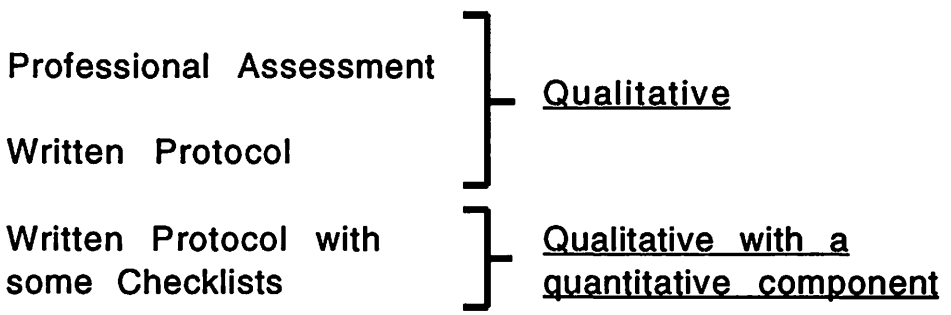
From a review of the literature in the adventure education field some general conclusions can be drawn:

a) There is much consensus in the writing about what categories should be covered in a safety management plan, as seen by adventure educators. These could be summarized under the broad headings:

Organization and administration
Safety systems
Staff selection, training and evaluation
Participants selection and monitoring
Equipment
Risk management
Physical plant and resources
Emergency procedures

b) There are several case studies in existence outlining how an audit team should be put together and the roles of those members.

c) There is very little sophistication in terms of the audit format itself. The audits reviewed in this document (which cover the leaders in the field of adventure education) leave the major decisions on the content of the audit in the hands of the audit team, with some guidelines. Formats used can be divided into the following categories:



d) There is general consensus that there should be in-town and in-field components.

e) The risks involved in adventure education can be seen as having different levels; in terms of degrees of consequence. Hence there is a good argument for weighting certain categories of risk in terms of importance in any audit.

f) Adventure educators feel the key to safety lies in the people in

the field; the instructional staff. They are left with the power, through their judgement and behavior, to carry out the actions which will decide whether an accident will occur or not.

g) Adventure educators point out their need to know why various safety measures are important. This would indicate a need for a manual that can accompany the audit, giving overviews of the various rationale for safety management practices and references to appropriate further reading.

Insurance and legal Issues:

Insurance:

Adventure education organizations need insurance to cover them against the occurrences they are working hard to avoid, should they ever happen: property damage, illness, injury and litigation. This is what insurance companies are in existence for and, for the adventure education organization, is a valid form of risk transference in their operation's risk management matrix. The problem is, as a survey by Wolff and Washburn (1984) revealed, that many adventure education programs had trouble getting insurance coverage and others found it but only at high cost. Wolff and Washburn asked the insurance companies for their comments on

covering adventure education programs. The responses can be summed up by two quotes, "We would certainly consider quoting on this type of risk, however, the quoted rate would be based on our evaluation of a particular risk . . ." and, " Our willingness to provide insurance for any given activity is greatly dependent upon the availability of information which we can use to determine the probability and severity of claims characteristic of that activity" (Wolff & Washburn, 1984 p.54-55).

The real problem then, is that as a relatively new industry, adventure education needs to establish a reliable track record with insurance companies. One writer expresses this as the " . . . Need to educate the insurance company about their program: What their programs do, what types of activities are involved, what populations they serve, how many staff, how many volunteers, how long their programs run, how many claims / near misses / losses have occurred, what did the claims / near misses / losses involve. They should be made aware of the perceived risk versus the actual risk of each activity" (Marlow, 1986 p.32). Mobley (1981) discussed the need for a standardized database of information for quantifying the risk. "Without such information insurance company agents can only make intuitive guess as to the objective risks associated with adventure activities" (Mobley, 1981 p.90).

The bottom line then is; if the insurance companies don't have access to the ". . .information, evaluations will be based on subjective data that hasn't been favorable to the field" (Wolff & Washburn, 1984 p.55). With this in mind and that, " to get the most favorable coverage at the lowest cost, an organization needs to demonstrate that it understands and practices risk management techniques" (Mobley, 1984b p.29).

Different writers have come up with checklists of practices to help become a better insurance risk:

a) - Establishing a procedure for accident emergencies and providing a record of injuries.
- Develop a written plan of supervision and be sure to hire only competent personnel.
- Establish and enforce safety rules, regulations and procedures.
- Provide in-service education for employees to keep them up-to-date with the latest information.
- Conduct regular inspections of facilities, areas and equipment and be sure to have an efficient program of maintenance.
- Check the progressive nature of the education program and training.
- Provide accident insurance for your participants for the inevitable accident that can and will occur.
- Provide liability insurance for the agency and your staff.
(Wolff & Washburn, 1984 p.55-56)

b) 1) Safety record of organization.
2) Safety record of similar programs.
3) Written policies, procedures and guidelines.
4) Standards for staff hiring, progression and supervision.
5) Adequate staff training.
6) Systems for handling emergencies.
7) Systems for detecting staff burnout.

8) Systems for detecting and correcting non-human hazards.
9) Real nature of risks involved.
10) 1st aid training.
11) Location of medical facilities on/off site.
12) Progressive training of students.
13) Risk transfer techniques.
14) Inspection schedules.
15) Use of safety coordinators, safety committees.
16) Top managements regular involvement in safety program.
17) Involvement in national and regional associations that address safety.
18) Regular reviews
19) Willingness to use experts.
20) Contingency plans for loss of key personnel.
21) Qualified personnel in safety in top management positions.
22) Understanding and identification process for high-risk participants.

(Mobley, 1981 p.98-99).

Legal Issues:

There have been many well written articles explaining the legal responsibilities that adventure programs have and their implications (Ewert, 1981; Ewert & Boone, 1987d; Frakt, 1987; Mobley, 1981; Priest & Dixon, 1990; Rankin, 1987b; Rawson, 1991; Rubendall, 1982; Van der Smissen, 1980; Van der Smissen, 1987).

Some authors have summarized the requirements that they see are necessary for outdoor programs to incorporate into their safety management plans to protect against possible litigation:

(Clement, 1988 p.32-34; Ewert, 1981 p.21; Koehler, 1987 Risk

management suggestion at chapter summaries; Mobley, 1981 p.171-172; Van der Smissen, 1980 p.34-35)

These lists reiterate, and build on the detail of, the categories and items already mentioned in this review and as such will not be repeated here.

Summary of Insurance and Legal Issues:

Investigating the literature relating to the legal and insurance aspects of adventure education has:

a) Revalidated the importance of the risk management approach, and hence the value of the auditing process itself, in terms of building a strong case with insurance companies.

b) Shown that the same categories of concern for inclusion in an audit of a safety management system have shown up again. The what for the audit is further documented.

Conclusion:

From a combined look at the information provided by the various disciplines of industrial safety management, adventure education, and the legal and insurance professions the following conclusions can be reached:

a) Auditing of safety programs is a valuable undertaking. This is especially true for small businesses that do not have the resources and staff to allocate to safety that larger businesses might.

b) Certain commonalities exist that are integral components of all safety programs. This fact makes it possible to construct a generic audit that will be applicable to all adventure education organizations.

c) The cost of making an audit generic is the reduction in specificity of questions. A generic audit therefore will be checking to see that key elements are in place. These elements can be assessed accurately in any culture by utilizing the professional judgement of trained auditors within that culture to check for level of compliance. Further to this there is the ability to remove parts of the audit if they are 'not applicable' in that particular legal or cultural setting.

d) Adventure education literature and safety management literature both point to the importance of people and their actions in the final effectiveness of any safety program.

e) Any audit produced needs to look at the various aspects of the safety effectiveness of an organization as displayed by Petersen's Model (Figure 9). Further, that the audit will need to use different methodologies to audit the different components, namely:

Behavioral Influence - survey/interview

Safety System - checklist

Physical Environment - inspection with criteria (safety sampling).

f) The audit should be based on contemporary methods of safety management: Quality management techniques and systems safety methods. This means that the adventure education industries should be audited to see if they are using pre-emptive tools and modern management methods, and if not guide them towards some.

g) Adventure educators require an accompanying document that gives an explanation of why various questions are contained in the audit, so they can better understand and improve their safety system.

CHAPTER III

METHODOLOGY

The purpose of this study is to investigate the knowledge contained within the industrial safety, adventure education, insurance and legal industries to see if a generic safety audit can be generated for the adventure education industry. The literature review reveals that this is possible. The following is a description of the audit design and the methods used to develop it.

Instrument Design:

The goal for the generic audit is to provide the management of any adventure education organization with a summary of their safety preparedness, controls, and practices. This summary can be thought of as a 'snapshot' of the safety program when compared against contemporary practices within other industry; i.e. the audit will provide the management of any organization with a basis for gauging strengths and identifying areas needing improvement. Suggestions for improvements will be indicated to bring the safety plan up to contemporary standard.

The audit is designed around the contemporary model of safety practices shown in Figure 8. Within this broad context, the goal is to use

Petersen's behavioral approach (Figure 9) as the base. The behavioral approach is used because the literature in both industrial safety management and adventure education stress the importance of people's behavior in the safety of any operation. In order to meet this goal the audit is constructed to measure three areas: behavioral influence, safety system and physical environment. In addition each area must consider the interaction of the others. Each of these areas requires a different methodology.

Behavioral Influence.

This section is concerned with the influence that the behavior of the staff of an organization have on the safety effectiveness of that organization. The approach to auditing the behavioral influence is based on the model shown in figure 11. In figure 11 the behavior of any individual is represented by their performance. This performance is a direct result of their motivation to perform. In turn, their motivation can be seen to be the result of many factors. These are the factors that are surveyed in this part of the audit. The audit contains indexes which measure the staff members' motivation to perform based on their:

- Current attitudes toward their jobs
- Current attitudes toward the organizational climate

- Current attitudes toward the safety program in the organization
- Background stress levels (past events affecting personality).

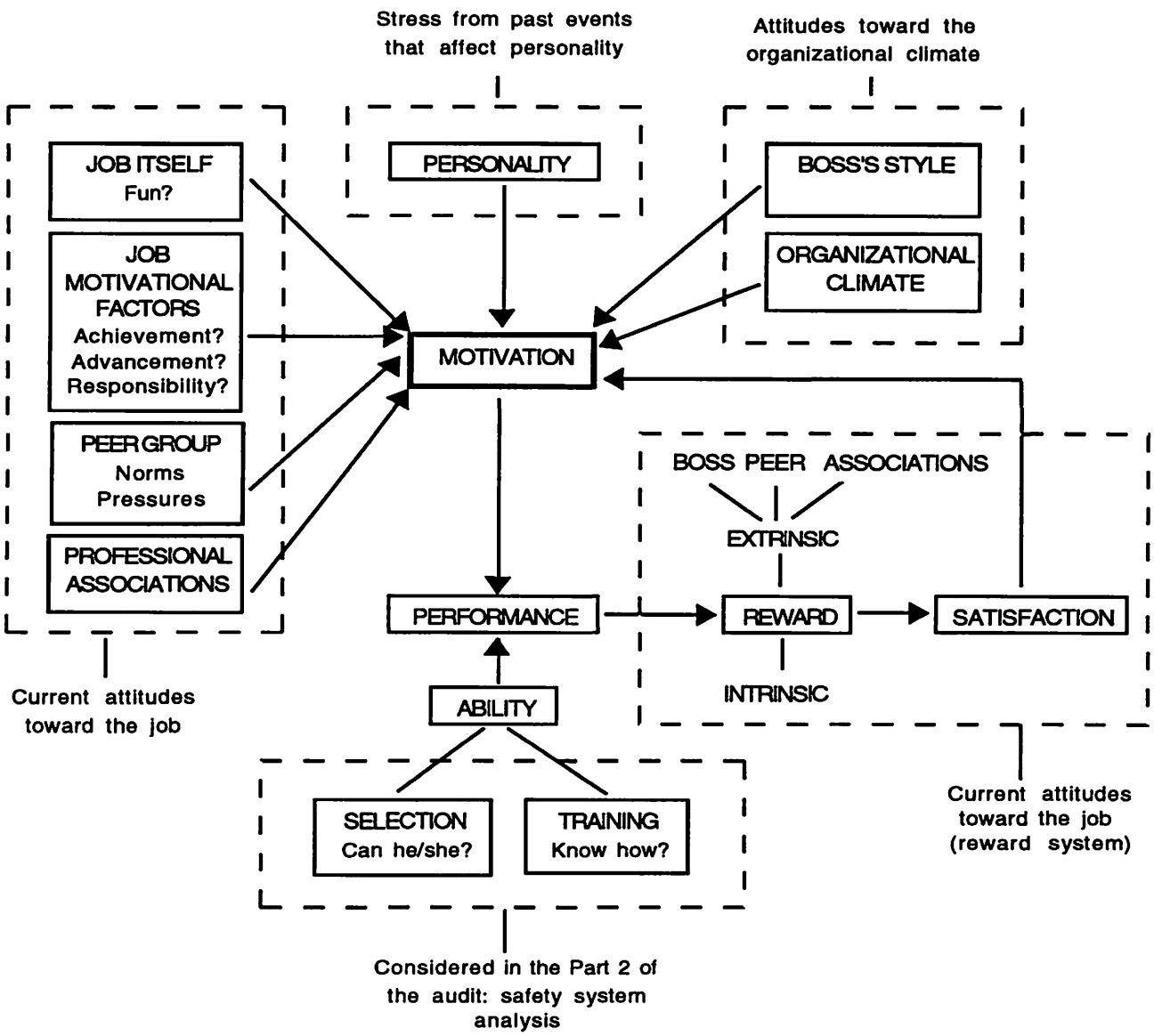


Figure 11: The behavioral system in terms of motivational factors.

Based on Motivational Factors (Petersen, 1980, p.83)

This part of the audit is designed to be self-administered and anonymous. The advantage of this is that staff may be willing to give truthful responses to questions they view as sensitive because of the anonymity of the questionnaire.

Safety System:

This part of the audit measures the completeness of the safety system operated by an organization compared to contemporary industry standards. The model used for the contemporary safety system is shown in a simple form in figure 12, and a more detailed form in figure 13. This model contains what W. G. Johnson describes in the Management Oversight Risk Tree (MORT) as the ". . . elements of a safety system congruous with goal-oriented, high performance system" (Petersen, 1980, p.56) As shown in figures 12 and 13, major categories to check within any safety system include:

- Management decision processes
- Hazard analysis processes
- Work flow processes
- Information and monitoring systems.

The safety system audit is arranged according to these major headings. Individual items checked for compliance under these headings, which

constitute an effective safety system, were obtained from the literature in the industrial management and adventure education fields.

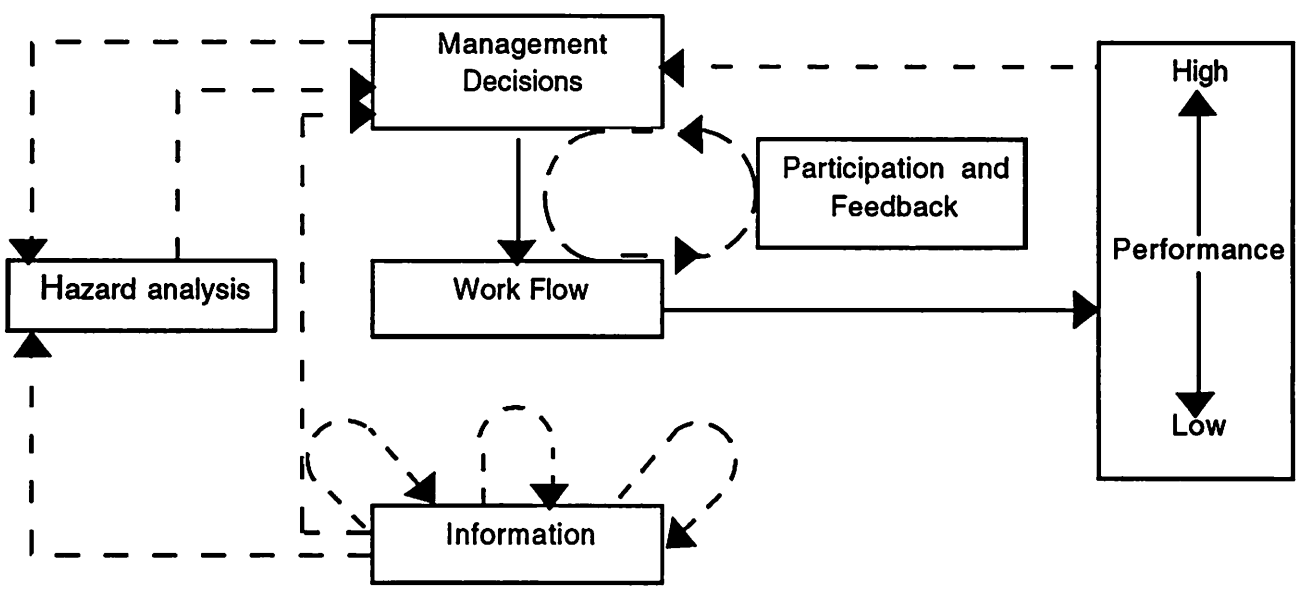


Figure 12: Safety System Congruous with Goal-Oriented, High Performance System (simplified version).
Six Elements of a Safety System by W.G. Johnson (Petersen, 1980, p.56)

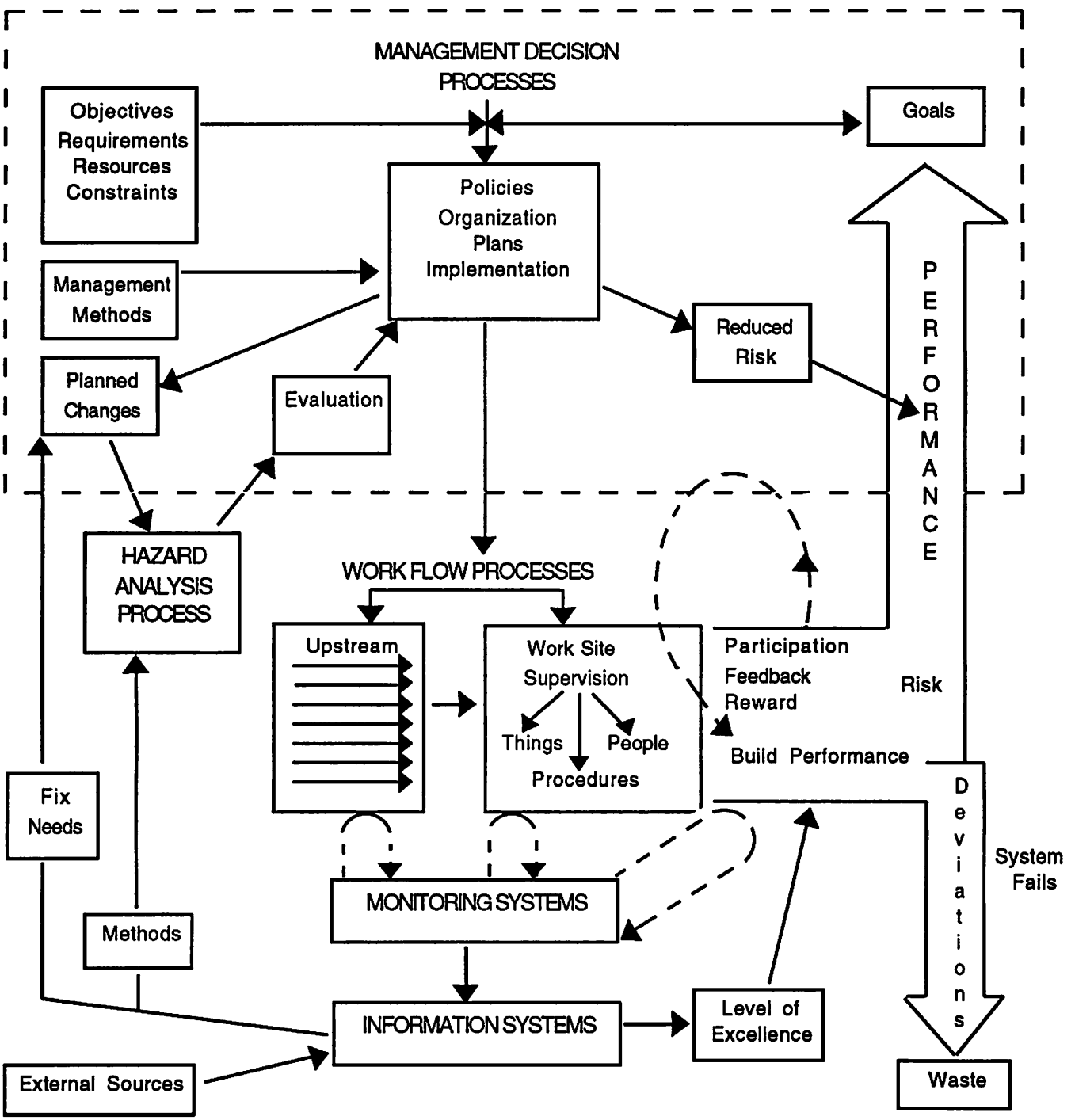


Figure 13: Dynamic Safety System - Congruent with Goal-Oriented, High Performance System.

Safety System Flowchart by W.G.Johnson (Petersen, 1980, p.57)

The safety system audit is of the type earlier identified as ***a checklist audit with weighting*** . The weighting of items was arrived at for any question by a subjective application of the following scale to the importance of the question:

Fundamental element of safety system:

Score = 30 points (major component) to 10 points (minor component)

Component part of fundamental element:

Score = 20 points (essential component) to

5 points (minor/less essential component)

In addition to the categories mentioned, a physical inspection procedure is included to check equipment and facilities. This serves to audit how effective the safety system is in ensuring the safe condition of the physical plant: buildings and equipment.

Physical Environment.

This section of the audit addresses the physical conditions that the staff and clients of any adventure education program operate under. It adopts a technique known as safety sampling which is used within industrial safety management to inspect for unsafe acts and conditions.

Safety sampling operates by compiling a list of unsafe acts and conditions, and safe acts and conditions, then checking at the work site as

to how many of each are observed. This system has the added advantage that it checks:

- the physical environment (safe and unsafe conditions)
- the interaction of people (behavioral system) with the physical environment (safe and unsafe acts)
- the interaction of people with each other (safe and unsafe acts)
- the interaction of the safety system with both the behavioral system and physical environment (managements attempts to control safe and unsafe acts and conditions)

Figure 14 shows these interactions that safety sampling audits.

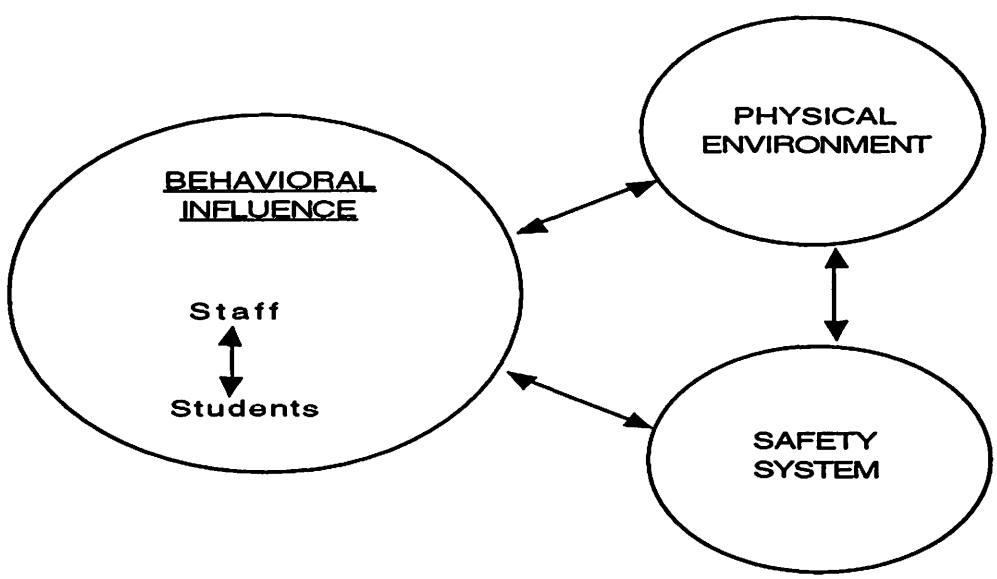


Figure 14: Interactions audited by safety sampling.

Thus by observing students and staff carrying out their activities in the field, not only will the physical environment be checked, but so will the interactions between each element of the safety program of the organization being audited.

An initial problem was encountered in finding an appropriate tool to use which would allow an auditor to compile a list of the acts and conditions to look for in observing any specific outdoor activity in progress. If the organization being audited already uses a systems approach to safety management, it will already possess a hazard analysis breakdown for each activity that it operates. This can easily be adapted to compile the list required for the safety sampling process. Based on a knowledge of many adventure education organizations, it is assumed that finding an organization that has a hazard analysis breakdown will be the exception rather than the rule, and that most organizations will be operating at the functional safety level at best. The opportunity exists then to demonstrate the power of the systems safety approach to any organization during the audit process, by role modelling this approach at the safety sampling stage of the audit in order to obtain a comprehensive checklist of inspection criteria for any activity.

Common systems safety tools that can be used in such an analysis

are either inductive (e.g. Fault Hazard Analysis; FHA) or deductive (e.g. Fault Tree Analysis; FTA). These methods are able to be applied to the adventure education industry and are very thorough, but for correct application require training in use and are time-intensive. A new tool was developed which offers less power than the systems approaches listed above, but which is more user-friendly to those in the adventure education field.

Roland (1983) states that a risk assessment model should have, at the very minimum, the five elements shown in Figure 15.

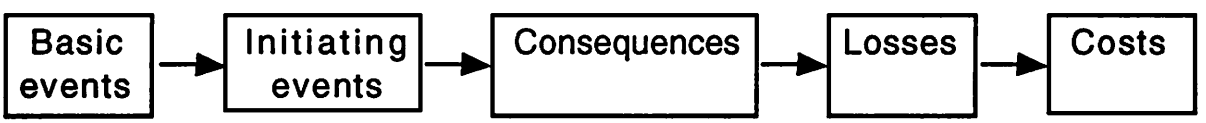


Figure 15: Risk Assessment Model. (Roland, 1983, p. 283)

Where the:

Basic events - are the causal factors that will result in an initiating event when they occur in sufficient number and unfortunate order. These would be human, machine, or environmental factors.

Initiating events - are all the possible minor or major accidents.

Consequences - are the possible results of the initiating event, up to the point of describing losses.

Losses - are the results of consequences. They describe mortality, injury, morbidity and property damage to the environment.

Costs - are the values placed on losses.

A risk analysis model based on Roland's five elements is shown in Figure 16. This is suitable for safety sampling and most other analytical purposes in an adventure education setting. For the purposes of the safety sampling tool required, the first two elements of the risk assessment model will allow the identification of any unsafe acts and conditions. These will result in a set of possible consequences, losses and costs. These consequences, losses, and costs can be reduced by appropriate risk management techniques. The techniques will provide a list of the safe acts and conditions required for the safety sampling process.

The best that the adventure education writers have produced in the way of a tool to use is the Risk Management Matrix; see Figure 10. However this tool has some obvious shortcomings when used. Beside the heading 'Risk Management', do the users list causal factors or consequences? Beside the headings 'Risk Management' and 'Crisis Management', there is confusion when a management technique does not fit the category heading that it is under; e.g. an identified risk might be equipment related but the management technique to reduce the risk might

be people related. Under what column should this be placed? No systematic approach is suggested in terms of deciding management techniques, and the consequences of these management techniques are not used to adapt the organizations safety system under the current model.

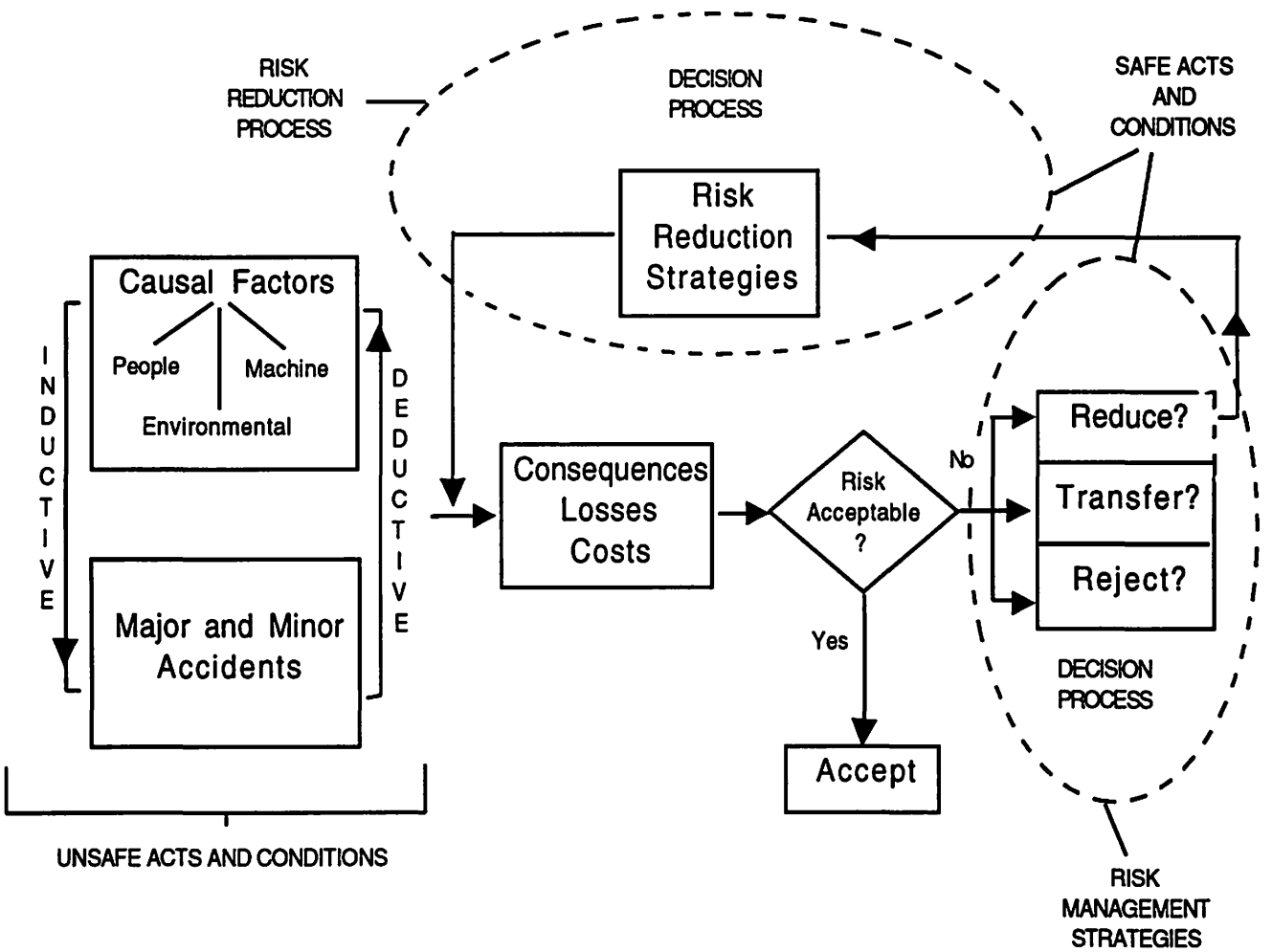


Figure 16: Risk analysis model used to determine safety sampling criteria.

The systems safety principles espoused by Roland, and incorporated into the model shown in figure 16, were applied to the Risk Management Matrix to produce the Risk Analysis and Management System (R.A.M.S.) used in the safety audit; see Figures 17,18, and 19. This is based on a deductive approach to the problem of risk analysis and a systematic approach to deciding the appropriate management techniques to employ. The deductive approach was chosen because this is the common method of thinking in the adventure education industry:

What is the worst that could happen?

How could that happen?

How could I prevent that from happening?

The decision process recommended in deciding the risk reduction strategies to be used is depicted in Figure 20.

For any activity then, a systems analysis can be conducted for that activity using the R.A.M.S. tool shown in figures 17 and 18, and incorporating the decision-making strategy shown in figure 20. This information can then be summarized using the form shown in figure 19 which provides the list of safe and unsafe acts and conditions that will be checked for during the safety sampling process.

RISK ANALYSIS AND MANAGEMENT SYSTEM

NAME: _____ **DATE:** _____

ACTIVITY/SITUATION: _____

Analysis		Description		
UNDESIRED EVENT(S) Accident, injury, other forms of damage.				
		People	**Equipment**	**Environment**
CAUSAL FACTORS				
RISK MANAGEMENT STRATEGIES	**Normal Operation**			
	Emergency			

Figure 17: Risk Analysis and Management System, page 1.

RELEVANT INDUSTRY STANDARDS APPLICABLE	
POLICIES AND GUIDELINES RECOMMENDED	
SKILLS REQUIRED BY STAFF	
FINAL DECISION ON IMPLEMENTING ACTIVITY	**Choose one** **Accept** **Reject** **Comments:**

Figure 18: Risk Analysis and Management System, page 2.

Inspection list of safe and unsafe acts and conditions.			
Safe Acts and Conditions	**Seen**	**Unsafe Acts and Conditions**	**Seen**
Instructor Dependent Factors:			
Management Dependent Factors:			

Figure 19: List of safe and unsafe acts and conditions to inspect for.

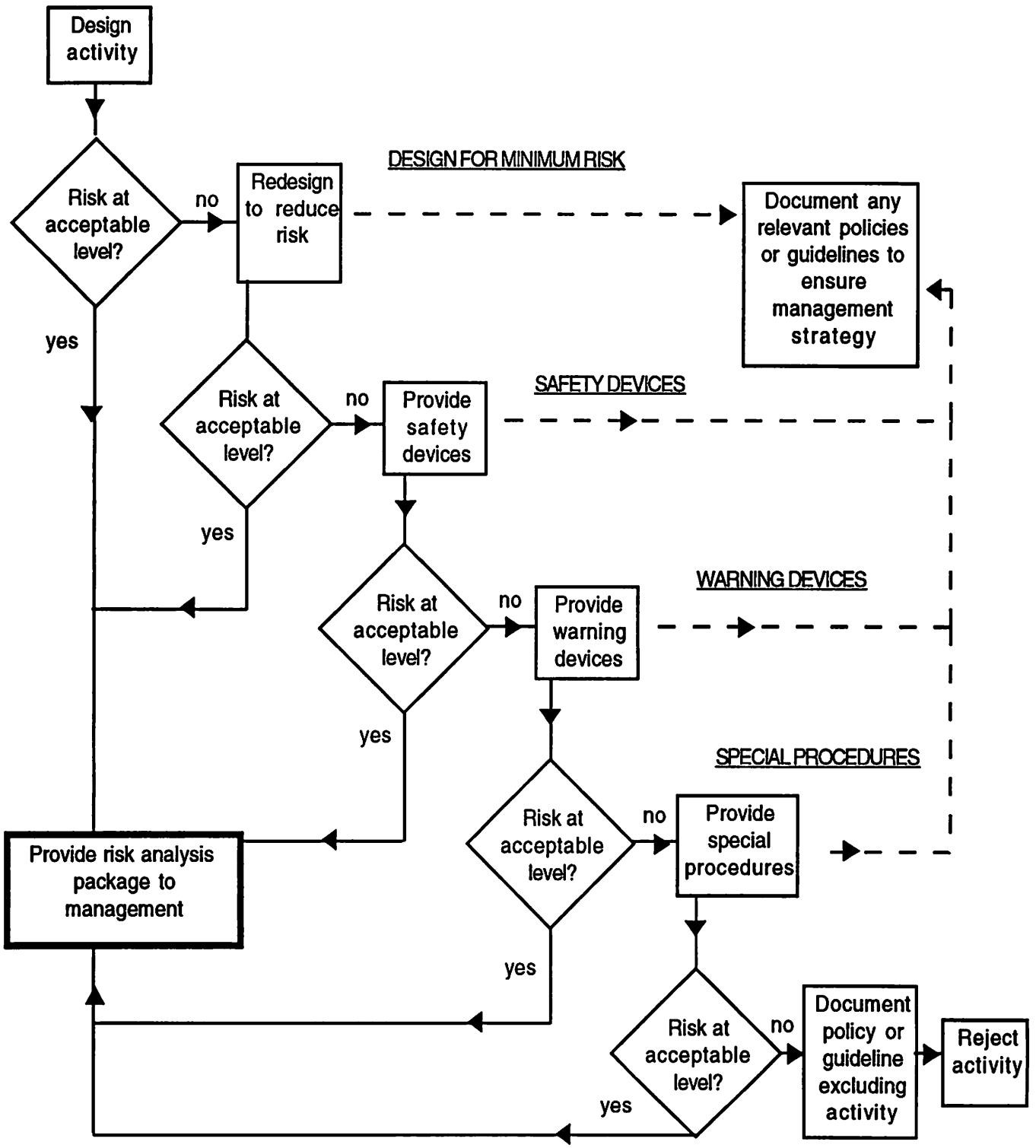


Figure 20: Decision-making process to decide risk reduction management strategies. Based on Hazard Reduction Precedence (Roland, 1983, p.40)

Subject Selection.

Since this is an evaluation design the subjects for the audit will be self-selecting. Organizations that wish to have their operation viewed by an external auditor for the purpose of an objective evaluation of their safety effectiveness will approach an auditor who has been trained to use this instrument. This audit can be applied to any organization which uses elements of adventure education in its work.

Conditions of Testing.

Although this audit can be applied to any adventure organization it is important that the organization is self-selecting. In this way it is more likely that most members of the organization will be committed to the audit process. This is an important condition of the audit because much of the information is gained from the staff themselves and so the validity of the results are dependent on the quality of the supplied data.

All auditors that comprise the audit team for any organization must be trained and experienced in the use of the instrument and in the interpretation of the results it produces. Necessary training involves attending a workshop, that has been approved by the author, on the theory and application of the audit instrument . This needs to be followed-up by observing an audit being carried out by an auditor accredited by the author.

In this way the intricacies and methodology of the audit process can be experienced first hand. If the accredited auditor feels the trainee has demonstrated satisfactory skills they will be considered a trained and accredited auditor.

The organization being audited needs to specify which activities it wishes to have audited. These must be able to be observed during the audit period. Auditors must be chosen who have the background knowledge to effectively audit these chosen activities.

Members of the management of the organization must be available to answer questions on the safety system that operates within the organization. In addition the organization must be able to assign a member of staff to act as guide during the audit process.

The auditors must be able to talk to all staff who will be surveyed to explain the nature of the audit process, the benefits it can offer the organization and to answer questions the staff might have. In this way it is more likely that the staff will be cooperative towards the process and contribute valid information.

An audit team of suitable size, with suitable time and suitable resources must be allocated for the purpose of the audit. The exact size, time needed and resources required will be dependent on the size and

scope of the organization concerned. However these details will be stipulated by the audit leader before the audit and agreed to by the organization before the audit process is started.

An estimate of time involved would be:

Behavioral survey and interpretation - 1 day

Safety systems audit and interpretation - 2 days

Physical environment - dependent on length of program element(s) to be audited.

Validity and Reliability:

This study is evaluative and so quantitative reliability measures were not relevant. Face and content validity concerns were addressed qualitatively. The audit has been determined to be valid in its content and approach through the following methods:

1) A review of pertinent literature

2) A team of experts were asked to comment on the audit for a check of content validity. The panel consisted of:

Professor William Fleischman, PhD - Associate Professor of Sociology at the University of Minnesota, Duluth. Expert on research methods.

Professor Jon Tofte - Assistant Professor in Industrial Safety at

the University of Minnesota, Duluth, and coordinator of a graduate program in industrial safety at that university. Expert in industrial safety and safety management theory, and former outdoor education program director.

Simon Priest, PhD - Lecturer in outdoor education, editor of A.E.E.'s safety practices in adventure programming: Expert in safety concerns in adventure education programming.

3) The audit was pilot-tested on two very different adventure education organizations:

A) The University of Minnesota Duluth Outdoor Program, and

B) the adventure education activities run by the Audubon Center of the North Woods, located near Sandstone, MN.

The reactions of the staff at the two organizations indicated very good face validity. The staff found the results of the audit to be enlightening and concurrent with thoughts they had about safety in their respective organizations. This feedback further reinforced the validity of the audit instrument.

4) The author trained a second auditor in the use of the instrument. During the second of the pilot-tests, both auditors separately scored the various categories of the audit as the process was carried out. At the

completion the results were compared and found to be extremely close (<5% discrepancy). This provides tentative verification that the instrument is reliable.

5) Changes were made to the instrument based on the results and feedback from both the panel of experts and the pilot-tests.

CHAPTER IV

RESULTS

The purpose of this study is to produce a predictive instrument to provide a measure of the balance of safety versus risk in any adventure organization; a generic safety audit.

Traditionally safety was considered a process of inspecting for unsafe conditions and correcting them, while now it is considered a function of how people behave in conditions which are both safe and unsafe. While conditions can be engineered which may be considered safer, far more important is the behavior of people in those conditions. Unsafe acts can occur in theoretically "safe" conditions, and safe acts can be carried out in what would be considered unsafe conditions. The audit that follows on these pages is built upon a behavioral approach to safety proposed by Petersen (1988) and represented in figure 9.

The behavioral approach contents that safety effectiveness is reliant on employee behavior which in turn is dependent on a number of factors. Past and current attitudes lead to current motivation to perform. This motivation is then influenced by the safety system in which the individuals operate, by the organizational climate and by the physical environment. The audit is devised to assess each of these component

parts and their interactions to gauge the safety effectiveness of the organization being audited.

The following pages show the audit as three parts:

PART 1: Staff attitudes survey - to measure the current motivation levels of staff to perform safely.

PART 2: Safety system audit - to measure the systems and management structures in existence against contemporary industry standards.

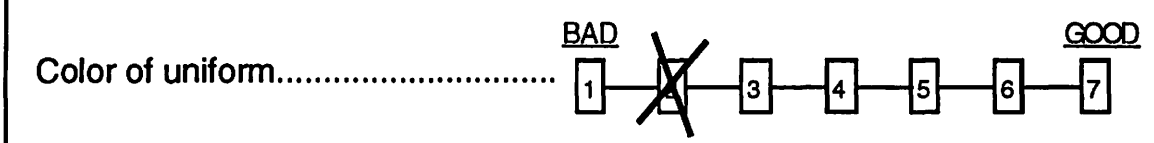
PART 3: Physical environment and interaction audit - to measure the levels of safe and unsafe acts/conditions currently in existence in the workplace.

Following each part is a procedure explaining how to analyze any results obtained.

PART 1: STAFF ATTITUDES SURVEY.

In the following few pages you will be asked questions relating to how you perceive various aspects of your organization and your role within it. Please answer each question as you see things; not as you expect others see them, or as you anticipate others may want them answered. Your responses are anonymous.
You will be asked to make certain choices along a continuum. Please place a cross in one of the numbers along the line that best illustrates your feelings between the two extremes. Please cross only one number.

For example: If you were asked what you felt about the following aspect of your job, and you felt fairly bad about it, you might cross as indicated.

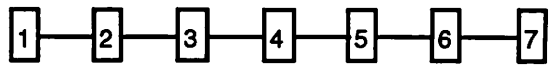


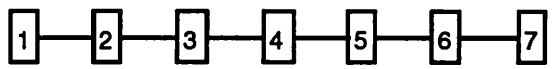
Please indicate how you feel about these aspects of <u>YOUR JOB.</u>

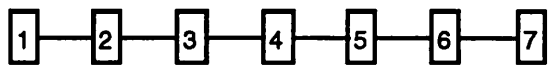
		BAD						GOOD
1.	Wages/salary.....	1	2	3	4	5	6	7
2.	Conditions of employment.....	1	2	3	4	5	6	7
3.	Status/position in workplace....	1	2	3	4	5	6	7
4.	Working conditions.....	1	2	3	4	5	6	7
5.	Equipment generally.....	1	2	3	4	5	6	7
6.	Buildings generally.....	1	2	3	4	5	6	7
7.	Vehicles generally.....	1	2	3	4	5	6	7
8.	Relations with peers.....	1	2	3	4	5	6	7
9.	Professional associations you can join and belong to.....	1	2	3	4	5	6	7
10.	Rewards for work other than salary.....	1	2	3	4	5	6	7
11.	Variety of work.....	1	2	3	4	5	6	7
12.	Living conditions (answer only if residential).....	1	2	3	4	5	6	7

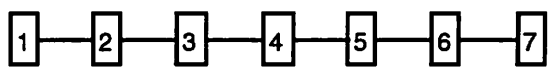
Please indicate how you feel about these aspects of <u>YOUR JOB.</u>

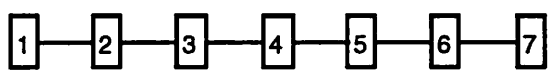
BAD GOOD

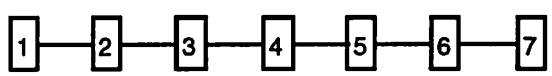
13. Sense of personal achievement... 

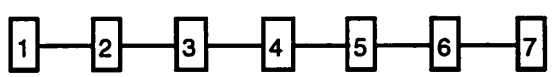
14. Recognition of quality of work... 

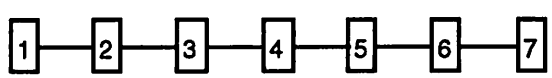
15. Value of work to others..... 

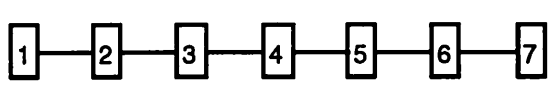
16. Enjoyment of job..... 

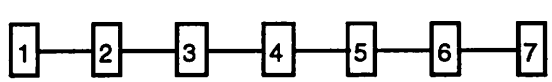
17. Possibility for advancement..... 

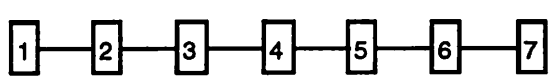
18. Chance for growth..... 

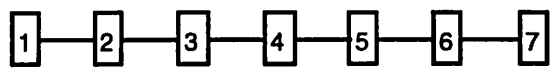
19. Training opportunities..... 

20. Individual goal setting..... 

21. Freedom to act..... 

22. Involvement in decisions..... 

23 Amount of responsibility..... 

24. Access to information..... 

Please indicate how you feel about the following aspects of the CLIMATE that exists in the management of your organization.

25. Demonstrates lack of confidence and secrecy — 1 2 3 4 5 6 7 — Demonstrates confidence and trust

26. No concern for people's problems — 1 2 3 4 5 6 7 — Deep concern for people's problems

27. Don't understand people's problems — 1 2 3 4 5 6 7 — Understand people's problems

28. Left on own to gain necessary skills — 1 2 3 4 5 6 7 — Provide training and assistance

29. Not taught how to solve problems — 1 2 3 4 5 6 7 — Taught how to solve problems

30. Give blame — 1 2 3 4 5 6 7 — Give support

31. No interest in your future — 1 2 3 4 5 6 7 — Interest in your future

32. Unapproachable — 1 2 3 4 5 6 7 — Approachable

Please indicate how you feel about the following aspects of the CLIMATE that exists in the management of your organization.

33. Does not seek information from you — 1 2 3 4 5 6 7 — Seek information from you

34. Restrict access to organizational information — 1 2 3 4 5 6 7 — Full access to organizational information

35. No input into decisions which affect you — 1 2 3 4 5 6 7 — Opportunity for input into decisions which affect you

36. No recognition — 1 2 3 4 5 6 7 — Recognition of work goals achieved

37. Inappropriate leadership style — 1 2 3 4 5 6 7 — Appropriate leadership styles

The following refer to the <u>SAFETY SYSTEM</u> in your organization. Indicate the extent to which you believe each applies.

38. Poorly stated safety goals — 1 2 3 4 5 6 7 — Clearly stated safety goals

39. Your safety role ambiguous — 1 2 3 4 5 6 7 — Your safety role in organization clearly defined

40. Accept mediocrity — 1 2 3 4 5 6 7 — Will only accept quality

41. All safety decisions and goals imposed from above — 1 2 3 4 5 6 7 — Asked for input to all safety decisions and goals

42. Ideas come down only — 1 2 3 4 5 6 7 — Flow of ideas down, up and across organization

43. No opportunity to observe other staff — 1 2 3 4 5 6 7 — Opportunity to observe other staff for ideas on the safe management of activities

44. No monitoring and feedback. Left on own. — 1 2 3 4 5 6 7 — Safety of work monitored and feedback given regularly

45. Feel inadequately trained to be safe in my job — 1 2 3 4 5 6 7 — Feel adequately trained to be safe in all parts of my job.

46. 1 2 3 4 5 6 7

OVERZEALOUS

Great amount of safety equipment required to be worn. Activities so controlled they are difficult to use effectively. Tone of program is heavy. Endless meetings about safety which don't have any personal meaning for the staff. Staff feel overexposed to the safety program, etc..

LIVELY

Staff identify with safety goals and are proud of their record. Staff feel safety programs are important. Safety is a lively aspect of the job and is more than avoiding risk or accident.

NEGLIGENT

Has programs only after the fact; gets busy about safety only after a major accident. Staff feel organization doesn't really care. Safety equipment is provided only to protect the organization.

Please answer the following questions about the SAFETY PROGRAM AND THE ENVIRONMENT in which you operate. Use the reverse side of the paper if necessary.

47. What do you think is the best aspect(s) of the safety program in your organization?

48. What is the worst aspect(s) of the safety program in your organization?

49. What would you most like changed in the safety program?

50. How would you want this changed?

51. What do you see as the greatest risks that you have to deal with in your work environment?

52. What unsafe acts or conditions have you observed that you feel need corrective action?

53. All staff members in an organization have certain needs. For each of the following listed needs:
a) Does your organization have a systematic way to assess that need?
b) How is that need assessed if it is?
c) Are your needs met effectively within the organization?

NEEDS:	a) ASSESSED?	b) HOW ASSESSED?	c) MET EFFECTIVELY?
Safety	Yes / No		Yes / No
Training	Yes / No		Yes / No
Motivation	Yes / No		Yes / No
Utilization of strengths	Yes / No		Yes / No
Personal problems	Yes / No		Yes / No
Stress	Yes / No		Yes / No
Other (Please specify)	Yes / No		Yes / No

The following is a list of events which occur in the process of living which can cause stress[1]. Indicate any you have experienced in the past 12 months.

	LIFE EVENT	POINT VALUE
____	Death of long time partner	100
____	Final separation from long time partner (divorce)	73
____	Separation from long time partner (marital separation)	65
____	Jail term	63
____	Death of close family member	63
____	Personal injury or illness	53
____	Marriage	50
____	Fired from work	47
____	Reconciliation with long time partner (marital reconciliation)	45
____	Retirement	45
____	Change in family member's health	44
____	Pregnancy	40
____	Sexual difficulties	39
____	Addition to family	39
____	Business readjustment	39
____	Change in financial status	38
____	Death of a close friend	37
____	Change to a different line of work	36
____	Change in number of arguments with partner (marital)	35
____	Mortgage or loan over	31
____	Foreclosure of mortgage or loan	30
____	Change in work responsibilities	29
____	Son or daughter leaving home	29
____	Trouble with in-laws	29
____	Outstanding personal achievement	28
____	Partner begins or stops work (spouse)	26
____	Starting or finishing school	26
____	Change in living conditions	25
____	Revision of personal habits	24
____	Trouble with boss	23
____	Change in work hours, conditions	20
____	Change in residence	20
____	Change in schools	20
____	Change in recreational habits	19
____	Change in church activities	19
____	Change in social activities	18
____	Mortgage or loan undertaken	17
____	Change in sleeping habits	16
____	Change in number of family gatherings	15
____	Change in eating habits	15
____	Vacation	13
____	Christmas season	12
____	Minor violations of the law	11
____	Other major events featuring in your life (score in relation to others).	?

Add up the total for all the items indicated.....SCORE____

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[1]The Social Readjustment Rating Scale. (Holmes & Rahe, 1967)

Analyzing Results for Part 1: Staff Attitudes Survey.

Summary figures should be prepared that give an indication of indexes for

- hygiene factors	**Questions 1 - 12**
- motivation factors	**Questions 13 - 24**
- supportive relationships	**Questions 25 - 31**
- group decision making	**Questions 32 - 35**
- manager's performance goals	**Questions 36 - 37**
- participative approach in general	**Questions 25 - 37**
- safety goal setting and communicating	**Questions 38 - 40**
- safety participative involvement	**Questions 41 - 42**
- safety feedback and reinforcement	**Questions 43 - 44**
- safety training outcome	**Questions 45**
- safety program in general	**Questions 46**

These are calculated by calculating a mean score in each index (question group) for each staff member. An average mark between 1 and 7 (to two decimal figures) should be reported for each index. As these marks are calculated watch for trends which indicate factors found particularly good by staff, and those found consistently lacking. Also look for groups of staff who may be very dissatisfied with a particular index (score low consistently) and others who may be having their needs met well (score high consistently. Even one staff member who is dissatisfied with a particular aspect of the organization is worth noting. This could be the

worst situation in some ways because a discontented social isolate could have unsafe behavior as his/her only outlet for their feelings of frustration.

An organizational mean for each index should then be calculated by averaging the means of each staff member in each index. The range for the index should also be noted. Other descriptive statistics should be calculated if necessary to adequately describe the resultant distribution e.g. standard deviation, mode(s), etc.

A mean score for any index of 3.0 or less would be considered low. An average for any index of 5.0 or more would be considered high. Scores between 3.0 and 5.0 indicate interpretation should be done with caution, taking into account other information attained from interview. The organization may be going through a transition period in the factor being measured, individual results scoring in either extreme may be canceling each other out, or the factor may only be being achieved within the organization to an average level.

Plot the resultant means (with range) in graphical form to visually summarize results

The following chart will act as an aid to interpretation of results.

Factor	Low Score	High Score
Hygiene Factors	Extrinsic needs are not being met. Staff are dissatisfied with the conditions under which they work and their material and social rewards. Over time this will lead to disillusioned staff who become increasingly resentful of the organization. Their attitude to all aspects of work, including safety will suffer.	Extrinsic needs are being met. Staff are content with material and social rewards and the work conditions generally.
Motivation Factors	Intrinsic needs are not being met. Staff are not turned on by their work. They may not value their work, feel responsible, be involved in decisions. At best they will carry out their job in order to get material rewards. At worst they will be uninterested, unproductive and unsafe.	Intrinsic needs are being met. Staff are highly motivated to do well. They are keenly interested in their work and motivated to improve their product.

Factor	Low Score	High Score
Supportive relationships	Staff do not feel that management is interested in them and their safety. A result can be that they will not be safe.	Staff feel that management has a strong interest in them and their safety. They will attempt to be safe in return.
Group Decision Making	Staff do not feel part of the decision making system. They are made to feel subordinate, dependent and passive. This reduces motivation to perform and can cause rebellion against the administration and imposed safety policies.	Staff feel empowered in the decision making system. They see themselves as equals, are independent and active in the organization. This leads to interest and motivation.
Manager's Performance Goals	Staff feel managers have an inappropriate style for them and show little recognition for their work. This can lead to resistance to the safety programs of management and loss of interest in work in general.	Staff feel that management style and recognition of their work is good. This leads to motivation to continue to perform well in the future.

Factor	Low Score	High Score
Participative Approach in General	Staff feel they have little role in the workings of the organization. The best that can be expected is passive, dependent staff. At worst the staff rebel against the lack of involvement either directly against the hierarchy or by ignoring safety rules and guidelines.	Staff feel actively involved in all the workings and decisions of the organization. They feel aligned with it. As such they are motivated to help build a better and stronger organization as part of the team.
Safety Goal Setting and Communicating.	Staff are not aware of safety goals, are not made accountable for performance and are not driven to produce and expect quality. This leads to poor attainment of safety standards throughout the organization.	Staff are aware of safety goals, know they are accountable to them and understand that quality results are expected. This leads to staff striving for quality performance.
Safety Participative Involvement.	Staff do not feel involved in the safety program and therefore are not committed to it.	Staff feel actively involved in the safety program and as such feel committed to it.

Factor	Low Score	High Score
Safety Feedback and Reinforcement.	Staff are not given enough feedback or reinforcement by good role modelling of expected behavior. As such they do not feel their work is valuable and do not know the standards that the organization expects. Their is no demand for quality performance and thus safety standards drop.	Staff are getting a good level of feedback and role modelling of expected behavior. They know the quality standards expected by the organization and strive to meet them.
Safety Training Outcomes.	Staff feel ill prepared for the jobs they are asked to do. They are placed in positions of stress because of this which compounds the safety problem further.	Staff feel well prepared for the jobs they are asked to perform. They are comfortable in their work and confident in their abilities to handle the work situation.

Summarize the qualitative feedback provided by staff in note form, stressing trends in particular, both favorable factors and those in need of improvement.

Finally, summarize the background stress levels of staff according to the categories shown on the summary sheet.

100 units scored within 12 months = 37% likelihood of serious illness or accident.

200 units scored within 12 months = 51% likelihood of serious illness or accident.

300 units scored within 12 months = 79% likelihood of serious illness or accident.

(Petersen, 1988, p. 298)

PART 2: SAFETY SYSTEM AUDIT.

The following instrument is designed to be administered by a trained auditor, with reference to the accompanying Auditor's Manual. It will give an indication of the standard of an adventure education organization's safety practices in comparison to a contemporary quality systems approach.

Scoring Notes:

Score the items in the audit according to the following regime:

AN . . . All or Nothing: Yes = points indicated; No = zero points
PJ . . . Professional Judgement: score up to the points indicated based on your professional judgement.
*** . . .** Signals that the category needs to be verified for compliance by some method other than by word of mouth: normally written material should be sighted; alternatively the behavior or practice could be observed in action.

Organization audited: _____

Date: _____

A) MANAGEMENT DECISION PROCESSES:	Score	Comments
1. GOALS:		
1.1 Does the organization have stated educational goals? (AN 0/30)*		
1.2 Do these convey a positive, quality-oriented message? (PJ 0 - 20)		
1.3 Does the organization have stated safety goals? (AN 0/30)*		
1.4 Do these convey a positive, quality-oriented message? (PJ 0 - 20)		
1.5 Have a set of organizational safety objectives been developed? (AN 0/30)*		
1.6 Is there a suitable communication system so that all staff are aware of these goals? (PJ 0 - 30)*		
Section Total:		
2. ACCOUNTABILITY:		
2.1 At top management level, is there a safety committee with the responsibility to administer the safety program? (AN 0/30)		
2.2 Are the responsibilities of the committee documented? (AN 0/20)*		
2.3 Do these responsibilities include: - setting safety goals? (AN 0/5)* - safety of staff? (AN 0/5)* - safety of participants? (AN 0/5)* - safety of property? (AN 0/5)*		

	Score	Comments
- safety of the environment? (AN 0/5)* - reviewing accident/incident reports? (AN 0/5)* - reviewing safety of proposed programs? (AN 0/5)* - reviewing safety of changes to programs? (AN 0/5)* - reviewing safety program? (AN 0/5)*		
2.4 Is a person in middle management tasked with coordination of safety aspects in day-to-day operations (safety officer)? (AN 0/20)		
2.5 For each employee is there a written job description? All [20] Most [15] Some [10] none [0] (AN 0/10/15/20)*		
2.6 Are the safety responsibilities of the staff member clearly stated in the job description? (PJ 0 - 20)*		
2.7 Do these responsibilities include: - organizational requirements? (AN 0/5)* - legislated requirements? (AN 0/5)* - reporting observed unsafe acts and conditions? (AN 0/5)*		
Section Total:		

3. GENERAL COMMUNICATION.	Score	Comments
3.1 How often does the safety committee report to the rest of top management? - not done [0] - annually [5] - 6 monthly [10] - 3 monthly or more [15] (AN 0/5/10/15)*		
3.2 Is the safety officer on the safety committee? (AN 0/20)*		
3.3 Is there a representative from the operational level (Instructional staff) on the safety committee? (AN 0/20)*		
3.4 Do all members of staff have a formal means to communicate their thoughts to the safety committee? (PJ 0 - 20)*		
3.5 Is there a formal process where the thoughts of the committee are communicated to all levels of staff? (AN 0/20)*		
3.6 How often does the middle management (Director, Chief Instructor) meet with other staff to discuss safety concerns? - not done [0] - 6 monthly [5] - monthly [10] - 2 weekly or more [15] (AN 0/5/10/15)*		
3.7 Is there a written record kept of major decisions reached at these meetings? (AN 0/20)*		
Section Total:		

4. SAFETY PROTOCOL.	Score	Comments
4.1 Is there a written safety protocol? (AN 0/30)*		
4.2 Does this protocol include: - rules or policies that all staff members must comply with? (AN 0/20)* - operating suggestions for the local conditions based on past experience of staff? (AN 0/10)* - emergency preparedness plans? (AN 0/15)* - accident investigations and analysis? (AN 0/10)* - employee safety training policies? (AN 0/10)* - personal equipment procedures? (AN 0/10)* - purchasing policy (AN 0/5)*		
4.3 Which of these means are used to arrive at the stated policies/rules? - analysis of accidents/incidents (AN 0/10)* - analysis of near misses (AN 0/10)* - contemporary industry standards (AN 0/5)* - formal hazard identification process (AN 0/10)*		
4.4 Are all policies/rules unambiguous and situationally valid? (PJ 0 - 30)*		
4.5 Are the responsibilities that staff have towards following policies/rules clearly stated? (PJ 0 - 10)*		
4.6 Are the responsibilities that staff have towards following guidelines clearly stated? (PJ 0 - 10)*		

	Score	Comments
4.7 Are the consequences of failing to follow stated policies/rules clearly stated? (PJ 0 - 10)*		
4.8 Is a formal procedure in place whereby staff can question, alter or propose new policies/rules? (AN 0/20)*		
4.9 Is the information above clearly communicated to all staff? (PJ 0 - 20)		
Section Total:		
5. SELECTION OF STAFF.		
5.1 Has an analysis been made of each job that exists in the organization to itemize the skills required for the job? (PJ 0 - 30)*		
5.2 Is the applicants level of skill, experience and qualifications considered against the listed requirements? (AN 0/15)		
5.3 What screening processes are used? - Application forms (AN 0/5) - Referees contacted (AN 0/5) - Interviews (AN 0/5) - Skill tests (AN 0/10) - Internships (AN 0/15)		
5.4 Which of the following are considered during the screening process: - accident history (including driving)? (AN 0/5) - general level of responsibility? (AN 0/5) - general stability of personality? (AN 0/5) - ability as an educator? (AN 0/5) - medical history? (AN 0/5) - physical condition? (AN 0/5) - substance abuse? (AN 0/5) - criminal record? (AN 0/5)		

	Score	Comments
5.5 What percentage of the current instructional staff is less than 25 years old? - >75% [0] - 75% - 50% [5] - 50% - 25% [10] - 24% - 10% [15] - <10% [20] (AN 0/5/10/15/20)*		
5.6 What is the average number of years of experience (at equivalent to full-time rate) the current instructional staff have working with students in a responsible role, particularly in adventure settings. - < 2 years [0] - 2 - 4 years [5] - > 4 years [10] (AN 0/5/10)*		
Section Total:		
6. STAFF CONDITIONS.		
6.1 Are there documents (eg staff contracts) outlining conditions of employment? (AN 0/20)*		
6.2 Do the conditions allow adequate provisions for: - holiday entitlement? (PJ 0 - 5)* - sick leave? (PJ 0 - 5)* - bereavement leave? (PJ 0 - 5)* - maternity leave? (PJ 0 - 5)* - maximum contact period without a break? (PJ 0 - 5)* - leave without pay for personal growth experiences? (PJ 0 - 5)*		
Section Total:		
7. EMERGENCY PREPAREDNESS		
7.1 Is there an emergency plan in writing to address all reasonably expected emergencies? (PJ 0 - 30)*		

	Score	Comments
7.2 Does it include well thought out plans to cope with: - lost party? (PJ 0 - 15)* - accident/injury? (PJ 0 - 15)* - fatality? (PJ 0 - 15)* - fire? (PJ 0 - 15)* - civil emergencies? (PJ 0 - 15)*		
7.3 Do emergency plans include assigning specific duties to specific individuals? (AN 0/5)*		
7.4 Is there an alternative for each key position? (AN 0/5)*		
7.5 Are the phone numbers of key personnel available? (AN 0/10)*		
7.6 Are all essential emergency services, telephone numbers and addresses listed? (PJ 0 - 5)*		
7.7 Are all numbers and addresses checked and updated not less than annually? (AN 0/5)		
7.8 Is there a written program to control information releases to the public in the event of an emergency? (AN 0/5)*		
7.9 Do emergency plans provide for adequate response during off-duty times (eg weekends)? (PJ 0 - 5)*		
7.10 Are objectives established for the training of staff for potential emergencies? (PJ 0 - 20)*		
7.11 Are mutual aid agreements established with outside organizations to provide help in the event of an emergency? (PJ 0 - 15)*		

	Score	Comments
7.12 Does the organization have contingency plans for the sudden loss of key personnel? (PJ 0 - 20)		
Section Total:		
8. RESOURCES.		
8.1 Have objectives been set for the timely turnover of all forms of equipment to ensure quality resources? (PJ 0 - 30)*		
8.2 Do inventories exist that include all equipment, etc., that the organization owns? (PJ 0 - 25)*		
8.3 Is this inventory updated annually at least? (AN 0/10)		
8.4 Is adequate insurance carried to cover the inventory? (PJ 0 - 30)*		
Section Total:		
9. LIABILITY.		
9.1 Are all programs based on progressive approaches to learning, applying skills that are suitable to the ability of the student? (PJ 0 - 30)		
9.2 Does the organization have a clear policy that all activities are to be entered into voluntarily? (PJ 0 - 30)*		
9.3 Does the organization have a clear policy that potential risks of activities are explained to participants (and their guardians in the case of minors) before they take part? (PJ 0 - 30)*		
9.4 Are all participants (and their guardians in the case of minors) asked to sign a release of liability before taking part in activities? (AN 0/25)*		

	Score	Comments
9.5 Is this release of liability witnessed? (AN 0/10)*		
9.6 Is adequate liability insurance carried to protect the organization? (PJ 0 - 30)*		
Section Total:		
B) WORK FLOW PROCESSES:		
10. STAFF ORIENTATION.		
10.1 Is there a formal orientation process documented for all new employees? (AN 0/30)*		
10.2 Does this include: - personal introduction to managers and the philosophy of participative management? (AN 0/10)* - familiarization with organizational goals and objectives? (AN 0/10)* - adequate familiarization period (no responsibility)? (PJ 0 - 10)* - training in the organization safety program? (AN 0/10)* - training in safety/risk management planning? (AN 0/5)*		
10.3 Is a senior member of staff assigned to each new staff member as a resource person? (AN 0/10)*		
10.4 Is time allocated to this senior member of staff for this purpose? (AN 0/5)		
10.5 Is the orientation of the new staff member checked by middle management for completeness? (AN 0/10)*		
10.6 Is there a formal orientation process documented for staff assuming new roles or programs? (AN 0/20)*		

	Score	Comments
10.7 Does this include: - familiarization with pertinent risk management plans (AN 0/5)* - a progressive assumption of responsibility? (AN 0/5)*		
Section Total:		
11. STAFF TRAINING.		
11.1 Are training goals and objectives set individually with members of staff? Not done [0] Some staff [10] Most staff [20] All staff [30] (AN 0/10/20/30)*		
11.2 Is a member of middle management involved in this goal setting? (AN 0/5)		
11.3 Are these goals arrived at taking into account: - list of skills required for the job? (PJ 0 - 20)* - industry minimum standards? (PJ 0 - 10) - expiry dates of qualifications? (PJ 0 - 5)		
11.4 Is special emphasis given to training staff where: - sources of high energy are involved? (PJ 0 - 10)* - non-routine programs are run? (PJ 0 - 10)* - driving is involved? (PJ 0 - 10)*		
11.5 Does the organization contribute significantly in time and money to achieving these individual goals? (PJ 0 - 15)*		

	Score	Comments
11.6 How often are the training goals reviewed? - not done [0] - annually [5] - six months [10] (AN 0/5/10)*		
11.7 What percentage of the instructional staff hold professional certifications that cover the activity areas in which they work at an appropriate level? - none [0] - <30% [5] - 30% - 60% [10] - 60% - 80% [15] - 80% - 100% [20] (AN 0/5/10/15/20)*		
11.8 How often do instructional staff get the opportunity to observe other staff (especially senior staff) working with clients? - never [0] - every 3 - 6 months [5] - every 2 - 3 months [10] - every month or less [15] (AN 0/5/10/15)		
11.9 Does management regularly take part in staff training that involves group training? (PJ 0 - 5)		
Section Total:		
12. PROGRAMS.		
12.1 Is a check made to ensure that every program that the organization agrees to undertake fits within the safety protocols? (PJ 0 - 10)		
12.2 Are instructional staff required to leave intentions or route plans for activities away from base? (AN 0/10)*		

	Score	Comments
12.3 Is there an adequate communication system from field to base that is suitable to the level of staff, students and aims of program? (PJ 0 - 20)*		
Section Total:		
13. SCREENING PARTICIPANTS.		
13.1 Are all participants screened for health before the program? (AN 0/20)*		
13.2 Does this screening include: - emergency contact address and phone (AN 0/5)* - age (AN 0/5)* - gender (AN 0/5)* - Doctor to contact (AN 0/5)* - allergies (AN 0/5)* - medical history (AN 0/5)* - medications presently on (AN 0/5)* - general physical condition (AN 0/5)* - dietary requirements (AN 0/5)* - ability in water (AN 0/5)* - medical insurance policy number (AN 0/5)* - place to mention other problems that might affect participation (AN 0/5)*		
13.3 Is the health form signed (by a guardian if a minor)? (AN 0/10)*		
13.4 Is the information on these forms readily available to those that need it? (PJ 0 - 15)*		
Section Total:		
14. MEDICAL PROGRAM.		
14.1 Do all members of instructional staff have current first aid certifications? (AN 0/20)*		

	Score	Comments
14.2 Do all members of instructional staff have current water safety certifications? (AN 0/15)*		
14.3 Are first aid kits of suitable quality required at all activities and in all vehicles? (PJ 0 - 15)*		
14.4 Is someone certified in first aid available at all times? (AN 0/10)		
14.5 Is transport available at all times? (AN 0/10)		
14.6 Is the medical program supervised by a certified person (eg EMT, nurse or Doctor)? (PJ 0 - 15)		
Section Total:		
15. PERSONAL EQUIPMENT.		
15.1 Are staff informed of the equipment they must supply in order to carry out their work? (AN 0/10)*		
15.2 Is the quality of the equipment checked by the management to ensure it meets industry standards? (AN 0/15)*		
15.3 Does the organization contribute financially (to a significant level) to replacement and maintenance of this equipment? (PJ 0 - 10)*		
15.4 Are students informed of the equipment they need to supply in order to have a quality program? (AN 0/10)*		
15.5 Is the quality of their equipment required to be checked before the students are committed to the program? (AN 0/15)*		

	Score	Comments
15.6 Does the organization have provision to loan or hire to individuals who can't supply their own? (PJ 0 - 15)*		
Section Total:		

C) HAZARD ANALYSIS PROCESSES:

16. CURRENT ACTIVITIES.

16.1 Does the organization have a documented, systematic breakdown of potential risks associated with each activity it carries out? (PJ 0 - 30)*

16.2 Have risk management methods been documented to ensure each risk has been reduced to an acceptable level? (PJ 0 - 30)*

16.3 Is this information freely available to all staff? (PJ 0 - 15)*

16.4 Are these analyses reviewed (at least every two years) by the safety committee to ensure the management methods remain contemporary?

No [0]
Some [10]
Most [15]
All [20]

(AN 0/10/15/20)*

16.5 Is there a formal process whereby staff can report hazards they observe in the workplace? (AN 0/20)*

16.6 Is there a documented process to ensure these reports are followed through? (AN 0/20)*

	Score	Comments
16.7 Is there the ability for an employee to refuse to work on the grounds of unacceptable hazard, until the hazard has been investigated and solutions put into place? (AN 0/15)*		
16.8 Are all reported hazards and their solutions reviewed by the safety committee? (AN 0/15)*		
Section Total:		
17. PLANNED CHANGES.		
17.1 Are all planned changes to programs systematically analyzed for potential risks? (PJ 0 - 30)*		
17.2 Have risk management methods been documented to ensure each risk undertaken can be reduced to an acceptable level? (PJ 0 - 30)*		
17.3 Does the safety committee review these analyses before the program is implemented? (AN 0/20)*		
Section Total:		
18. NEW PROGRAMS.		
18.1 Are all new programs systematically analyzed for potential risks? (PJ 0 - 30)*		
18.2 Have risk management methods been documented to ensure each risk can be reduced to an acceptable level? (PJ 0 - 30)*		
18.3 Does the safety committee review these analyses before the program is implemented? (AN 0/20)*		
Section Total:		

D) INFORMATION AND MONITORING PROCESS:

Score

Comments

19. INFORMATION GATHERING.

19.1 Does the organization have a comprehensive library of relevant legislation, codes of practice, and related standards for all the activities they are involved in? (PJ 0 - 20)*

19.2 Is this library readily available to everyone? (PJ 0 - 5)*

19.2 Does the organization receive weather forecasts suitable to the activities it carries out? (PJ 0 - 20)*

19.3 Is there a process for suitable field information to be gathered prior to activities (eg snow stability, river flows)? (PJ 0 - 20)*

Section Total:

20. STAFF PERFORMANCE REVIEWS.

20.1 How regularly are staff systematically observed and given quality feedback on their safety performance?

- not done [0]
- yearly [5]
- six monthly [10]
- every 3 - 6 months [15]
- every 3 months or less [20]

(AN 0/5/10/15/20)*

20.2 How regularly are performance reviews carried out between individual staff and their supervisors?

- not done [0]
- yearly [10]
- six monthly [20]

(AN 0/10/20)*

	Score	Comments
20.3 Which of these levels of staff are performance reviews carried out for: - managers? (AN 0/10)* - instructional staff? (AN 0/10)* - other staff? (AN 0/10)*		
20.4 Do these reviews include: - review of individual safety performance? (PJ 0 - 10)* - job satisfaction factors? (PJ 0 - 10)* - job motivational factors? (PJ 0 - 10)* - other matters wanting to be raised? (PJ 0 - 10)* - review of previous goals and objectives? (PJ 0 - 10)* - setting new goals and objectives? (AN 0/10)*		
Section Total:		
21. ACCIDENT/INCIDENT MONITORING.		
21.1 For which of the following does the organization have a formalized investigation procedure: - fatalities? (AN 0/30)* - injuries? (AN 0/20)* - near misses? (AN 0/20)* - illnesses? (AN 0/10)*		
21.2 Do the investigations include recording of: - Name, age, sex, address of person(s) involved? (AN 0/5)* - Names and contacts of witnesses? (AN 0/5)* - Time, place, weather details? (AN 0/5)* - Brief description of incident? (AN 0/5)* - Summary of any treatment given? (AN 0/5)* - equipment and property damages? (AN 0/5)*		

	Score	Comments
- Time lost from program due to incident? (AN 0/5)*		
21.3 Are these analyzed using multiple causation principles? (PJ 0 - 30)*		
21.4 Are they analyzed in total each year for significant trends? (PJ 0 - 15)*		
21.5 Is there a written procedure to ensure that remedial actions and follow-up of the investigation is carried out? (PJ 0 - 25)*		
21.6 Is the safety committee required to review the investigation and implemented changes before the investigation is considered closed? (AN 0/10)*		
21.7 Is the organization a member of a group that shares the statistics, report forms and lessons learned from such accidents and incidents? (AN 0/10)*		
21.8 Are all accident/incident reports easily accessible to all members of staff? (PJ 0 - 15)*		
21.9 Is the organization's incident rate acceptable? (PJ 0 - 20)*		
21.10 Is the organization's fatality rate acceptable? (PJ 0 - 20)*		
Section Total:		
22. PLANNED SAFETY AUDITS.		
22.1 Are audits of the safety program built into the objectives of the organization? (AN 0/15)*		

	Score	Comments
22.2 How often are these carried out? - not done [0] - every 5 years [5] - every 3 - 5 years [10] - every 2 years [15] - every year [20] (AN 0/5/10/15/20)*		
22.3 How often are audits conducted by external auditors? - not done [0] - every 5 years [5] - every 3 - 5 years [10] - every 2 years [15] (AN 0/5/10/15)*		
22.4 Are checklists of items to look for provided for the auditors? (PJ 0 - 20)*		
22.5 Are all unsafe acts and conditions observed during the audit rated as to risk potential? (PJ 0 - 15)*		
22.6 Are audit reports and recommended follow-up actions given to the safety committee? (AN 0/20)*		
Section Total:		

23. EQUIPMENT INSPECTIONS.

Complete the following form for each separate type of equipment owned by the organization. For example; first aid supplies, ropes courses, hire gear, camping gear, kayaks, vehicles, etc.

Equipment Type: _____ **Date:** _____

	Score	Comments
23.1 Are regular inspections made of all items of equipment to ensure quality performance is available at all times? (PJ 0 - 20)*		
23.2 Has a checklist been prepared for those inspecting the equipment that will enable all substandard items to be discovered? (PJ 0 - 20)*		
23.3 Are the inspections regular enough to allow substandard items to be discovered? (PJ 0 - 20)*		
23.3 Are the inspections regular enough to allow substandard items to be discovered? (PJ 0 - 20)*		
23.4 Are these inspections documented? (PJ 0 - 20)*		
23.5 Is a preventative maintenance program in place? (PJ 0 - 20)*		
23.6 Is a system in place where faulty equipment is taken out of service or repaired promptly? (PJ 0 - 20)*		
23.7 Is the equipment currently in a safe operating condition? (PJ 0 - 30)*		
23.8 Is the equipment up to contemporary standards and meet all relevant codes? (PJ 0 - 20)*		
23.9 Is each item of equipment ergonomically safe in design? (PJ 0 - 15)*		

	Score	Comments
23.10 Are the items of equipment stored appropriately? (PJ 0 - 10)*		
23.11 Does the organization's safety plan adequately pass on the potential risks associated with the equipment? (PJ 0 - 10)*		
23.12 Does the organization's safety plan allow a suitable induction period to train staff to use the equipment in question? (PJ 0 - 10)*		
Section Total:		

24. INSPECTIONS OF FACILITIES.

Complete the following form for each separate building or facility inspected. Score is determined for any item by using professional judgement.

Facility Inspected: _____ **Date:** _____

	Score	Comments
24.1 FLOORS: clean, non-slip, free of protrusions. (PJ 0 - 10)		
24.2 AISLES & PASSAGEWAYS: unobstructed, wide enough. (PJ 0 - 10)		
24.3 STAIRS: right dimensions, angle, railings, non-slip. (PJ 0 - 10)		
24.4 EXITS/EGRESS: number, unlocked, signed, size. (PJ 0 - 10)		
24.5 VENTILATION: adequate for conditions. (PJ 0 - 10)		
24.6 LIGHTING: adequate for purposes. Emergency lights. (PJ 0 - 10)		
24.7 CHEMICALS & FUELS: appropriate storage, temperature, labelled, separated from others, exits. (PJ 0 - 10)		
24.8 WASTE DISPOSAL: Adequate numbers of receptacles, divided for recycling purposes. (PJ 0 - 10)		
24.9 TOOLS & ELECTRICAL EQUIPMENT: good condition, guards provided, safety apparel available. (PJ 0 - 10)		
24.10 WARNING SYSTEMS: Fire warning systems installed, operative and instructions in case of fire posted. (PJ 0 - 10)		

	Score	Comments
24.11 FIRE PROTECTION: adequate number and type of portable fire extinguishers, hoses and sprinklers. (PJ 0 - 10)		
24.12 FOOD STORAGE: sanitary storage, temperature. (PJ 0 - 10)		
Section Total:		

Analyzing results for Part 2: Safety System Audit.

Total scores for each of the sections indicated in the audit, and convert these to percentages. For any section the scores can be interpreted as:

0% - 50% Low - major components are missing from the safety system to adequately address this factor.

50% - 80% Medium - The organization is making some efforts in this category however changes still need to be made to the safety system to ensure the factor in question is appropriately covered.

80% - 100% High - The safety system is doing a good job at meeting the requirements of the factor in question. Some fine tuning is probably all that is required.

Summary of Factors Audited: Information in parentheses is an interpretation of a low score in the factor.

	Score	Percent
MANAGEMENT DECISION PROCESSES:		
1 Goals. . . . . (The organization requires clearly defined and communicated goals in order to demonstrate to staff its commitment to safety and a quality product.)	____/160	____%

2 Accountability. . . . . ____/ 170 ____%
(An accountability system must be established for every level of the organization so that everyone is aware of their role and the interdependence of roles. In this way people realize that they are responsible for the final delivery of that stated responsibility, and can be measured against the standard expected.)

3 General communication . . . . . ____/ 130 ____%
(Communication lines must exist within the organization so that everyone is aware of what is happening at all other levels. In this way people will feel part of the general safety effort and feel they are part of a team working towards a common goal.)

4 Safety protocols . . . . . ____/ 245 ____%
(An organization should possess a set of written protocols based on the knowledge gained from the past experience of staff within the organization and pre-emptive analysis of possible risks. These should be communicated to staff in order to set staff up for success in the field. When the organization states these protocols it is equally important to state the consequences of not following them. At the same time they should be worded in such a way as to be situationally variable so as not to restrict an instructor to following them when they would be unsuitable. There should also be a formal way for staff to have input into the alteration or addition of protocols so that they are empowered and have ownership of them.)

5 Selection of staff. . . . . ____/ 155 ____%
(Staff should be screened in a systematic way in order to get the best match of skills for the role they are to fulfill.)

6 Staff conditions . . . . . ____/ 50 ____%
(Staff should be working under conditions that eliminate unnecessary stress. This should allow suitable non-contact time, provide support in times of personal problems/issues, and opportunity for personal growth.)

7 Emergency preparedness . . . . . ____/ 200 ____%
(Well thought out emergency plans will reduce stress on staff in times of emergency and help ensure the quality of response at those times.)

8 Resources..... ____/ 95 ____%
(The staff require quality resources in order to carry out quality programs. It is managements responsibility to make this happen.)

9 Liability..... ____/ 155 ____%
(The organization should take reasonable steps to protect itself from the possibility of litigation which could signal the end of any adventure education operation.)

TOTAL: ..... ____/1340 ____%

	Score	Percent

WORK FLOW PROCESSES:

10 Staff orientation..... ____/ 130 ____%
(New staff, or staff assuming new roles in the organization, need to be given a formal orientation to that role. This should include responsibilities, disclosure of risks and should be checked for completeness. A mentor should be formally appointed so that each staff member has someone whose responsibility is to answer questions and help with orientation. It should not be left up to the individual to continually have to impose their questions on others.)

11 Staff training..... ____/ 165 ____%
(Staff should be regularly setting goals for further training, with the help of management, and receive assistance to attain these goals. The quality that is expected of them should be demonstrated by good role models in the organization.)

12 Programs..... ____/ 40 ____%
(Programs should be set up to meet the same safety protocols expected of staff. In addition communication lines should be established so that parties in the field can be located should the need arise.)

13 Screening participants ..... ____/ 105 ____%
(Participants should be screened for possible risks before any program is undertaken.)

14 Medical program. . . . . ____/ 85 ____%
(The organization is required as part of its duty to the client to be able to provide quality treatment in case of incident occurring.)

15 Personal equipment. . . . . ____/ 75 ____%
(Staff and students should be using quality equipment in any program to prevent unnecessary risk from this potential source.)

TOTAL: . . . . . ____/ 600 ____%

HAZARD ANALYSIS PROCESSES:

16 Current activities. . . . . ____/ 165 ____%
(All activities should be systematically analyzed for potential risks. Management strategies should then be developed for each risk and this information available to staff. Technology and techniques change and so these plans should be updated at regular intervals. If staff see potential hazards in the field there should be a mechanism whereby there concerns can be officially registered and they know that they will be actioned.)

17 Planned changes . . . . . ____/ 80 ____%
(All planned changes to programs should be analyzed for risks, and plans to manage the risk developed before the changes are implemented)

18 New programs . . . . . ____/ 80 ____%
(All new programs should be analyzed for risks, and plans to manage the risk developed before the new programs are implemented)

TOTAL: . . . . . ____/ 325 ____%

INFORMATION AND MONITORING PROCESSES:

19 Information gathering. . . . . ____/ 65 ____%
(The organization should have available all contemporary information pertaining to its field of operations in order to make decisions.)

20 Staff performance reviews . . . . . ____/ 130 ____%
(As a follow-up to accountability, staff should regularly take part in

structured performance reviews in order to receive quality feedback on their to measure their achievement of set goals. This should allow a new set of goals to be set to motivate even higher quality in the future.)

21 Accident/incident monitoring. . . . . ___/260___ ___%
(A procedure should be in place that allows information to be gained from accidents/incidents/near misses such that they can be prevented from being repeated in the future. Multiple causation principles should be employed so that all causes are remedied.)

22 Planned safety audits. . . . . ___/105___ ___%
(Regular external audits should be planned and carried out so that the organization can get objective views of their safety effectiveness.)

TOTAL: . . . . . ___/560___ ___%

EQUIPMENT INSPECTIONS:

Equipment type _____ ___/215___ ___%
(Steps should be taken to ensure that each type of equipment is in a safe operating condition and that it is adequately stored, has a maintenance program in place, and is checked so the quality of operation is continually guaranteed.)

INSPECTIONS OF FACILITIES:

Building or facility _____ ___/120___ ___%
(Each building or facility should be made free from dangers to the users.)

Graph the resultant percentages scored for each of the variables to provide a visual summary of results. A report can be compiled based on these scores and the qualitative comments recorded during the audit process. Recommendations can be made on actions that could be taken to improve the safety system.

PART 3:

PHYSICAL ENVIRONMENT

&

INTERACTION AUDIT.

For each of the program elements you are planning to observe, carry out a R.A.M.S. analysis using the instrument on the following pages. This will identify safe and unsafe conditions and acts to look out for. Be aware that there may be many different management techniques (safe acts) to deal with certain situations. This means the auditor will need to be prepared to adapt their completed R.A.M.S. to the situation.

RISK ANALYSIS AND MANAGEMENT SYSTEM

NAME: _____ **DATE:** _____

ACTIVITY/SITUATION: _____

Analysis		Description		
UNDESIRED EVENT(S) Accident, injury, other forms of damage.				
CAUSAL FACTORS		**People**	**Equipment**	**Environment**
RISK MANAGEMENT STRATEGIES	**Normal Operation**			
	Emergency			

RELEVANT INDUSTRY STANDARDS APPLICABLE	
POLICIES AND GUIDELINES RECOMMENDED	
SKILLS REQUIRED BY STAFF	
FINAL DECISION ON IMPLEMENTING ACTIVITY	Choose one Accept Reject Comments:

Analyzing results for Part 3: Physical environment and interaction of factors:

For each activity observed summarize observations in a quantitative manner by simply stating the number of safe acts/conditions observed and the number of unsafe acts/conditions observed. Express the safety quality attained for the event as a percentage:

$$\text{safety quality} = \frac{\text{number of safe events}}{\text{total number of events}} \times 100$$

Summarize observations, both safe and unsafe, in a qualitative manner and attach these to the R.A.M.S. analysis for the activity.

Making overall recommendations:

From the results of the individual parts of the audit the team should compile an interim report. This will summarize the safe acts/conditions, so that the host program can build on what it is doing well, and also the unsafe acts/conditions as feedback required to improve quality.

Each of the unsafe acts/conditions should be explained in full as to the impact it could have on the staff, participants and organization. It should then be assigned a quantitative risk score according to the formula

below[2].

Risk Score = Consequences x Exposure x Probability

Where:

Consequences

Degree of severity of consequences

Catastrophe: numerous fatalities or extensive damages, major costs to organization, major disruption	100
Major: fatality or serious damages and costs to the organization	50
Serious: extremely serious or disabling injuries or large costs	25
Notable: injuries requiring professional medical attention, lost work time	10
Minor: minor cuts, bumps and bruises; minor damage	1

Exposure

The hazard event occurs:

Continuously: many times daily	10
Frequently: approximately daily	6
Usually: from once a week to once a month	3
Occasionally: from once a month to once per year	2
Rarely: has been known to occur or known to be possible	1

Probability

That the accident sequence, including consequences, will occur:

Most likely: expected result and consequences	10
Quite possible: would not be unusual, an even 50/50 chance	6
Unusual: unlikely to occur, but not to be ruled out	3
Rarely: extremely unlikely but has been known to happen	1

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[2] Risk scores and justification scores are based on the work of W.Fine, 1973.

Examples:

1) A high zip-wire (flying fox), used every day by groups, is found to have a defective pulley due to no inspection program being in place:

risk score = (C=50) x (E=10) x (P=10) = 5000

2) A low ropes course element does not use any form of spotting for its students:

risk score = (C=1) x (E=10) x (P=6) = 60

Obviously the assigning of scores is a subjective process but is very helpful in ranking faults according to seriousness. It should be kept in mind as a rough guide that a risk score:

Greater than 250 indicates a condition requiring immediate correction. The activity should be discontinued until the hazard is reduced.

90 - 250 is urgent. Requires attention as soon as possible.

20 - 90 should be eliminated without delay, but the situation is not an emergency.

The team then needs to recommend changes that will improve the quality of the program. These need to be realistic in terms of what the organization can be expected to achieve with its resources. The recommendations should be prioritized according to Justification Score,

where:

$$\text{Justification score} = \frac{\text{Risk Score}}{\text{Cost factor X Degree of Correction}}$$

Cost Factor

Estimate of dollar cost and difficulty of corrective change

Large: many thousands of dollars; difficult and lengthy	10
Moderate: hundreds of dollars; average time and effort	5
Easy: very little cost; fast and simple changes	1

Degree of Correction

The degree the proposed change will eliminate or alleviate the hazard

100%	1
>75%	2
50% - 75%	3
25% - 50%	4
<25%	6

Examples: Consider again the examples given above in terms of the following recommendations.

1) Recommend that the program

a) Discontinues using the zip line until;

b) A new pulley is purchased of appropriate standard, and a monthly inspection and maintenance program is put in place.

Justification a) = 5000 / ((CF = 1) x (DC = 1)) = **5000**

As cost is nothing and it provides 100% correction.

Justification b) = 5000 / ((CF = 5) x (DC = 1)) = **1000**

As cost is over $100 and the inspection program should completely solve future problems.

2) Recommend that staff are trained in contemporary spotting techniques and that having students spot each other becomes an operating procedure for low ropes elements, written into the staff handbook.

Justification = 60 / ((CF = 1) x (DC = 2)) = **30**

As the cost is minor assuming someone on the staff can instruct others, and the effect these changes will have should eliminate the hazard more than 75% of the time.

As seen from our small case history above, the priority we would suggest is:

1) Discontinue zip line use until other corrections made . . . 5000

2) Buy industry standard pulley and institute monthly inspection and maintenance program 1000

3) Train staff in spotting and write procedure into staff manual for low ropes course elements 30

CHAPTER V

CONCLUSION

The purpose of this study was to generate a generic safety audit for adventure education programs based on techniques used in other industry. The audit was to be able to give an indication of current safety preparedness of any adventure education organization and identify needs in its safety management processes, guiding progress towards improvement of those processes.

A review of literature in the fields of safety management revealed that :

1) Safety audits for any industry were considered feasible, desirable and valuable.

2) Making an audit generic, in order that it can be applied industry wide, necessitates making audit questions general so that they can be interpreted for a wide range of users. The negative implication of this is that the audit may not be able to successfully assess the safety readiness of the organization, due to the lack of specificity of the questions. This potential limitation of the audit can be avoided by using the professional judgement of trained auditors to interpret the generalized questions and

award points for the organization's state of compliance to the questions, based on the auditors' training and past experience.

3) That the audit needs to be able to be adapted by auditors in various cultures to make the instrument applicable in terms of language and items that may be made obsolete in that particular culture.

4) That the audit should be based on principles of :

- systems safety
- quality management
- multiple causation.

5) That the most efficient and efficacious approach to the audit was to use a behavior-based construct. This led to the auditing system adopted for this study being designed in three parts: a survey of staff attitudes to establish motivational levels, a checklist audit of the safety system in the organization, and a safety sample of the physical environment. The last part of the audit also samples the interaction of all parts of the organization's safety plan, in that a safety sampling process views the actual current state of the safety functioning of staff and students in the field including the effects of past and current behavioral influence and the organizations safety system.

The audit was field tested on a panel of experts and pilot tested on

two different adventure education organizations.

Findings:

1) The field test indicated that the auditing instrument had good content validity.

2) The audit had a high level of face validity. This was gauged by its acceptance as an appropriate safety audit by the individuals in the organizations it was tested on.

3) A crude measure indicates that this instrument shows signs of having a high level of reliability when trained auditors are used.

4) Organizations, although outwardly stating their openness to the safety audit, exhibited very defensive behavior to the process beforehand. Safety in any organization is a sensitive issue, and even more so when inferences are going to be drawn to management styles and comments are to be passed on safety effectiveness. The author considers it normal that the process will be viewed by most as threatening. It was found that by maintaining open communications with the staff of the organizations, carefully explaining the positive nature of the process and its potential rewards, and remaining positive and receptive to the barrage of questions that people have that defensiveness is kept to a minimum.

Once the auditing process actually began, the staff involved all

became very positive to the process. There were many opportunities for the staff to learn a great deal about safety management during the process.

5) Individual staff members were keen to find time alone with the auditor to express their opinions on organizational safety. It is important to listen to everyone but be nonjudgemental in all aspects of the audit. By presenting information collected as a summary of the present state of the organization, and making recommendations based on theoretical constructs while remaining nonjudgemental in the process, defensiveness is further defused and replaced by a questioning attitude.

6) The information provided by the audit was considered valuable by the organizations audited. This confirms the appropriateness of the industrial safety models applied to adventure education settings.

7) Many of the instructional staff were concerned by the emphasis on structured approaches to safety (based on systems safety and multiple causation concepts). The threat they saw was that their ability to use judgement in the field was being threatened. When it was explained that it was management's responsibility to provide staff with information based on previous experience of other staff, and systematic evaluations of activities in order for staff to be able to make better informed

judgements in the field, many of their fears were alleviated.

Limitations:

Limitations exist in the audit design at present due mainly to the lack of application and exposure that it presently has. Within each of the three parts of the audit the quantitative values obtained can't be compared across the adventure education industry because no norms have been established. In part 2 of the audit (Safety System) the values assigned to each question, to give a weighting to signify the importance that question holds, were decided by the author. While reference was made to industry weightings of similar types of questions, it cannot be assumed that the same weightings can and should apply within adventure education. A Delphi panel of respected experts in the field of adventure education, and safety management within the adventure education industry in particular, could be used to get a consensus view on the weightings used.

Conclusion:

The audit described in this study can be applied to any adventure education organization. It is based on industrial models of contemporary safety management. When implemented by a trained auditor the audit is a valuable predictive and diagnostic tool. It is able to provide measures of the current safety effectiveness of an adventure education operation, and

guide towards improvement of safety systems in order that they become more effective.

Safety is, and will continue to be, an important issue in any organization where risk is involved. In an increasingly litigious world the threat is that all risk will be eliminated and with it all challenge, adventure, and much joy of life and discovery. With the help of tools such as this it is hoped that risk can be maintained at an appropriate level to the educative goals of an organization without compromising the safety of the participants in those programs.

Implications:

The power of this instrument can only be realized if it is used. The challenge now is to market the instrument throughout the adventure education world in such a way that it is seen as a non-threatening asset rather than a destructive weapon. This may best be done through selective application of the audit to key programs whereby the reputation of the instrument will spread by word of mouth, and by endorsement by key organizations in different countries such as the A.E.E. in the U.S. and the N.Z.O.I.A. in New Zealand[1].

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1 Association of Experiential Education
New Zealand Outdoor Instructor's Association

The potential exists in the future for further research based on this instrument. The author's hypothesis is that the safety of an adventure education organization will improve through repeated applications of this audit and by steadily working to implement suggested changes. This could be tested in a time-series design using accident, incident and near-miss statistics each year for various organizations using the instrument, and comparing with organizations that don't.

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APPENDICES

Risk Management Audit
A System for
Adventure Education Programs.

AUDITOR'S MANUAL

This manual is designed as a reference tool for auditors who have received appropriate training in safety auditing. An ethical user of this manual will have:

(1) Attended a training course in the use of the auditing instrument, approved by the author.

(2) Acted as an assistant auditor on an audit of an adventure education program, supervised by a skilled auditor, and have received a recommendation from that auditor as to their ability to administer the audit and interpret the results.

A

CAUTION

to potential users of this instrument.

This audit can not administered successfully by untrained persons. While I originally set out to create an audit that would be generic in nature, and be capable of self-administration, I quickly became aware of my naivety on the second point. The profession of safety management contains a body of knowledge that is large in size and technical in nature. In order to audit an organization to contemporary standards it is important to be aware of the range of techniques to look for, be aware of, recommend for use, and apply. This takes training and time!

My fear is that adventure educators may get hold of this document, and in the independent manner that typifies the industry, attempt to audit themselves. Reasons for this could include:

- wanting to stay in control of the results
- believing that they can do it themselves
- costing less
- being scared of outsiders observing their operation

My advice is DON'T. Consider the benefits of having an external auditor who is trained in these techniques carry it out for you:

- provides an objective look at your unique systems and problems
- validates audit results in terms of application and interpretation of the instrument
- lowers long term costs by being directed to good management methods in a shorter period of time.
- trains your staff by the auditor demonstrating contemporary safety management techniques which can be used in the daily running of your operation.

The gains made in having an objective assessment made by an expert will far outweigh the costs. The choice of auditor(s) however is critical. Not only do these people need to be expert in the outdoor field under review, they need to be diplomatic, and be skilled in safety management. If you choose your expert carefully, the whole process should aid in developing a more efficient and effective program. It is designed to be a positive and enlightening experience, and confidential to the organization under review.

Grant Davidson.

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CHAPTER I
INTRODUCTION

This audit arose out of a need that was perceived to exist in the adventure education industry - how can a Director of an outdoor program measure the effectiveness of the safety program that exists within the operation?

Within the adventure education field one is continually faced with a paradox much talked about by those involved; the paradox of the coexistent needs for both risk and safety (Mobley, 1981; James, 1980; Ongena, 1981; Ewert, 1984b). This is represented this in figure 1 below.

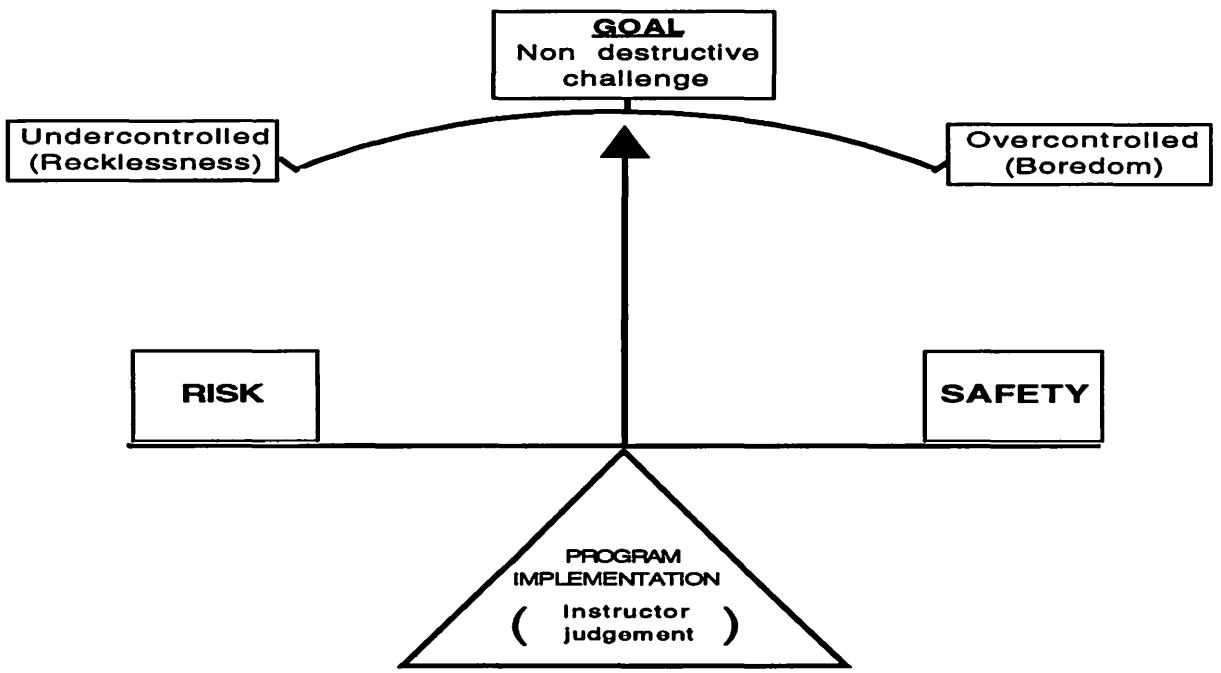

Figure 1: Risk vs. Safety Meter for Adventure Programs.

The goal of adventure education programs is to provide the participants with an appropriate challenge so that they can grow personally in a variety of ways. In order to have challenge, a certain amount of risk is required. The presence of risk, by definition,

necessitates the possibility of loss (Mobley, 1981). This loss can be physical (injury, death), emotional or property related. Participants come to the program, or are referred, because of the positive outcomes of the challenge and it is expected that they will be protected from the negative aspects - loss. This is one fundamental difference between adventure (self-directed) and adventure education (facilitated) (Ewert, 1984b; Hollenhorst, 1987, Ewert, 1988c).

Adventure education programs must therefore ensure an adequate degree of safety controls to balance the risk they undertake. There is danger to participants and the organization if they err too far on either side of the scale. If too much risk is undertaken, with too little safety control, the program can be considered reckless. The long term effect of this will be injury, death, property damage and the organization being closed down; either through the public not wanting to put themselves at risk, through litigation, or through criminal negligence proceedings. On the other hand if the organization uses too many safety controls while avoiding risk, the challenge element of the program will be gone, participants will be bored and the public will not want to use the services offered. Boredom may also lead to inattention and the potential for risk from this. Hence the paradox and the need to measure safety effectiveness of the program.

Traditionally there are crude measures that administrators can use to measure the risk/safety balance existing in their programs.. They can listen to what their staff and clients are saying. It is rare that they indicate that activities are too risky; if they do program managers should pay heed. It is more common that staff and students want to push the limits; "We've been doing this for five years, lets extend it and add this." or "We've done that activity before, now take us on something really exciting." The danger is that rather than the activities being inappropriate, the staff are becoming desensitized to them through long exposure, or the client is unable to judge real risk and their actual skill level correctly; therefore needing this pointed out to them through good facilitation. The potential then is to operate with too much emphasis on the risk side of the meter, and be reminded of this one morning as administrator with an early morning phone call.

What is needed is a suitable analytical tool that will provide feedback, both qualitative and quantitative, on the effectiveness of the safety program within the organization. The results of such an analysis

can act as a motivating factor to direct energy and resources into areas identified as weaknesses by the analysis. This preemptive approach is far more appealing than facing the early morning phone call.

Within other industries safety professionals have been dealing with the successful control of risk through safety programs for many decades. To measure the effectiveness of safety programs auditing systems have been developed that can be used on small or large industries. A review of the knowledge existing in the fields of safety management and adventure education led to the creation of this audit instrument. It measures the safety effectiveness of adventure education programs against contemporary standards.

In reviewing the safety management literature many similarities between adventure education and other industries became apparent. For example, smaller businesses generally have a worse safety record than larger ones which have larger resources. Those in the adventure education field can identify with this; too much to do and too little time to do it, let alone try and deal with the intangible aspects of safety - "lets leave safety for the instructors to worry about; as administrators we'll get on with marketing and fundraising". Also safety management theory has shifted emphasis from a traditional approach of inspecting for unsafe conditions to an approach based on people; safety being seen as a function of attitudes and behaviors. This fits neatly into the intuitive approach that adventure educators have: that safety is a "people" issue. The people being instructors, participants and managers who should be monitoring all aspects of the safety effort.

These commonalities that continued to show up were encouraging indicators that industrial safety management techniques were applicable to adventure education. The resulting audit is based on these techniques and is people/behavior oriented.

The audit presented here is believed to be applicable to any program which uses adventure education primarily or as a component part of a larger program. When administered in an appropriate manner, by an appropriately trained auditor, it will provide any adventure education program with constructive feedback on the state of its safety effectiveness and suggest ways to improve its safety program.

Grant Davidson, 1992.

CHAPTER II

THEORETICAL BASIS FOR THE AUDIT

Traditionally it was believed that safety could be engineered into an organization by processes including the correct design of tools and work stations, and inspections for unsafe conditions; correcting them to make them 'safe'. It is now recognized that an engineering approach is only a small part of the safety problem. Unsafe acts can occur in well-engineered work places, while safe acts can occur in what could be considered to be unsafe work places. This aspect has long been known intuitively to adventure educators and is represented in figure 1 by the pivotal point of the risk/safety meter: program implementation, and more specifically instructor judgement. It doesn't matter what safety precautions are taken by the organization, the behavior of the instructor with the students can change the entire risk/safety balance.

This audit is based on a people, and thus behavioral, approach to safety, as opposed to an engineering approach. This behavioral approach is represented in figure 2.

The model shown in figure 2 suggests that safety effectiveness is a function of employee behavior which in turn is dependent on a number of factors and interactions. Past and current behavioral influences produce current motivation in employees. This motivation to perform, combined with ability, is filtered by the safety system and the environment to produce the final behavior. The audit is devised in such a way to test each of these component parts and their interactions.

This explains the three part approach of the audit:

PART 1: Behavioral influences
PART 2: Safety system
PART 3: Physical environment and interaction between all components.

Each part of the audit requires using a different methodology to measure the various factors.

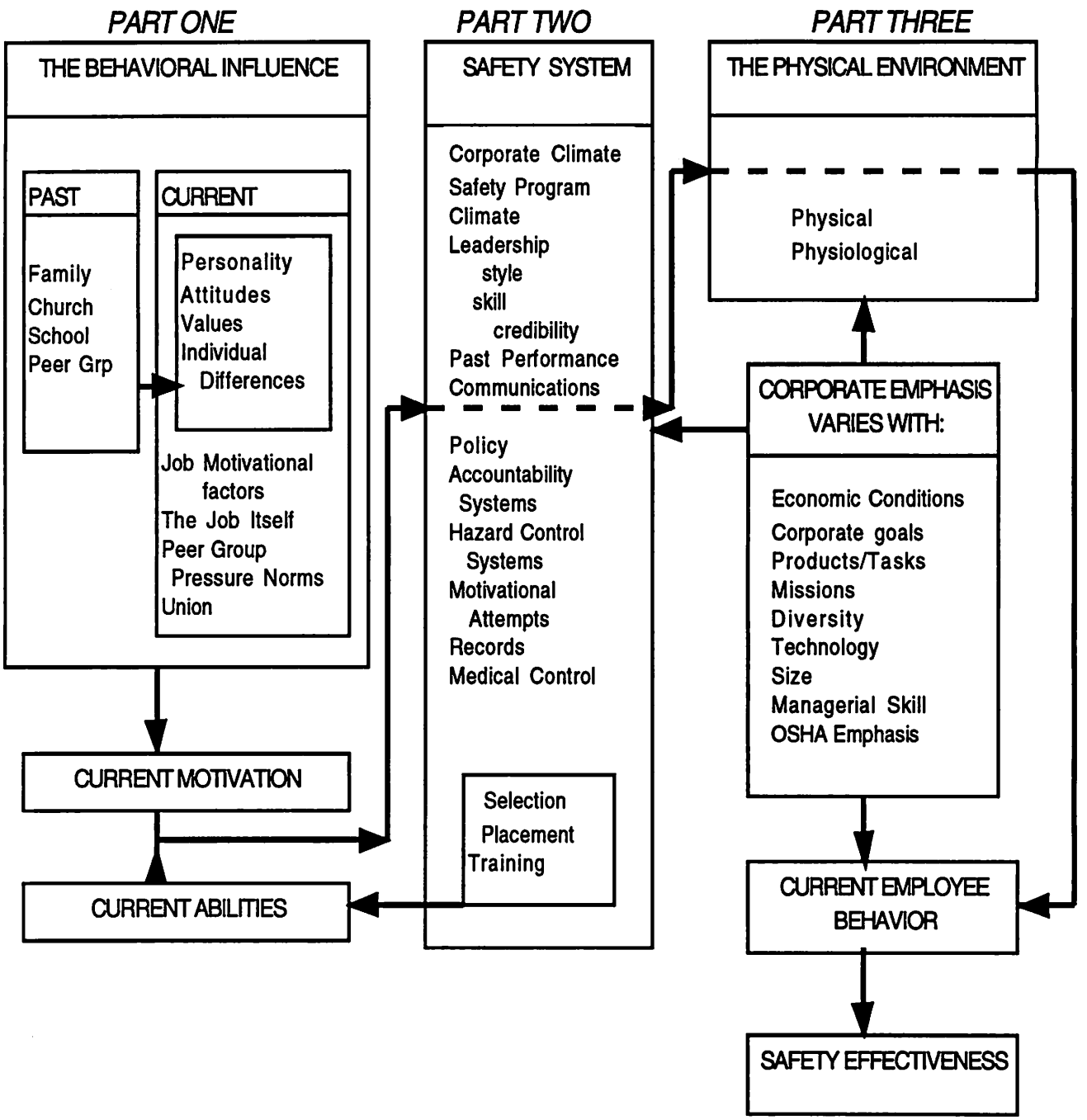

Figure 2: Factors Affecting Safety Effectiveness. (Petersen,1980. p.29)

PART ONE: Audit of the Behavioral Influence.
(Method of auditing = staff attitudes survey)

As shown in figure 2, the final safety effectiveness of an individual staff member depends on their behavior, and this in turn is determined by their motivation to perform and their ability to perform. Their motivation and ability are dependent on a number of factors more clearly illustrated in figure 3.

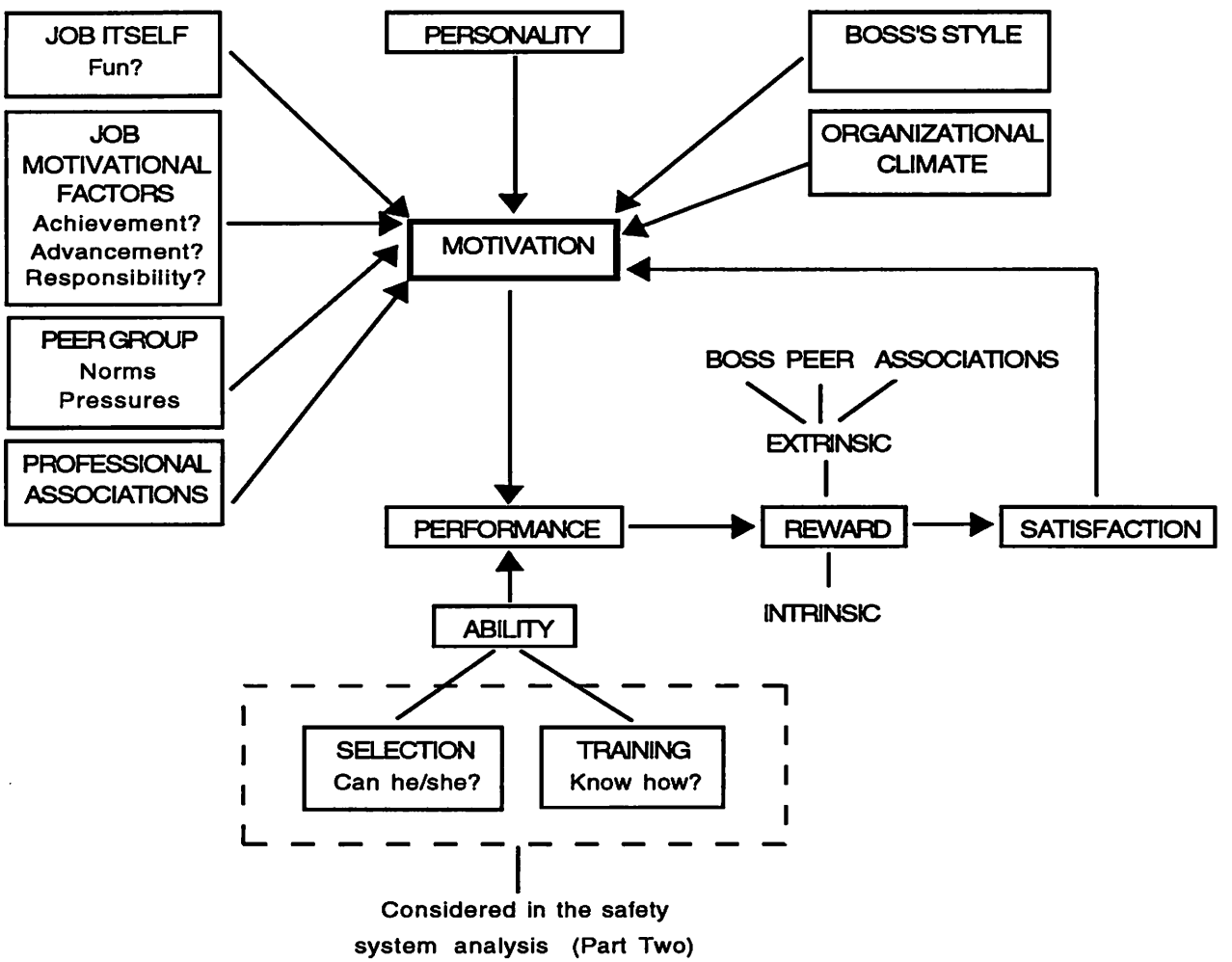

Figure 3: The behavioral system in terms of motivational factors.
Based on Motivational Factors (Petersen, 1980, p.83)

Each of the various factors, that are indicated in figure 3 as affecting motivation, are audited in Part 1 of the audit with the exception of ability factors. These ability factors are audited in Part 2 of the audit where they are considered part of the organizations safety system.

It is time intensive to audit behavior directly, and difficult through observation to determine causes of the observed behavior. To do so would require observers to live in the organization, observing staff continually, and monitoring their reactions to various changes and interactions. This is not feasible within the constraints of a normal auditing procedure. Another approach is to measure behavior indirectly. The Attitude-Behavior Model shown in figure 4 is a common approach used in research to measure behavior indirectly. Beliefs and attitudes that staff hold about various aspects of their job are used as indicators of intentions (motivation) and thus possible behavior.

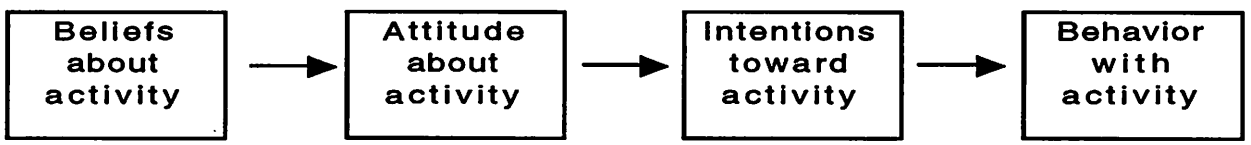

Figure 4: Attitude - Behavior Model Adapted from Fishbein and Ajzen (1975)

The audit of behavioral influences then, comprises a survey of staff attitudes to various aspects of their job. This survey of attitudes is divided into component parts as indicated in figure 3. The theoretical basis for the inclusion of various questions and the constructs for indexes that are measured is explained below.

CURRENT FACTORS (Audit, Part 1: Questions 1 - 24).

These are based on the dual factor theory of Herzberg (Herzberg, 1966). In a comprehensive review of all articles on job satisfaction and motivation from 1900 - 1955 Herzberg found that what people said positively about their job experiences were not the opposite of what they said negatively about their job experiences. In other words factors that cause job dissatisfaction are a separate class than those that cause job motivation. On one continuum are the factors that if present lead to no

dissatisfaction, and if not present lead to job dissatisfaction. These are the extrinsic factors such as policies, wages, working conditions, supervision - and termed by Herzberg as Hygiene Factors. Hygiene, in the medical sense, is a preventive means of stopping illness and disease, but its presence does not ensure wellness, just lack of unwellness. Herzberg termed these factors hygiene factors because in a similar way they are a preventive measure for dissatisfaction. On the other continuum are the intrinsic factors such as achievement, recognition, value of the work, responsibility, etc - and termed by Herzberg as Motivation Factors. If these are present the worker will be motivated to perform, and if absent will not be. These two independent continua are shown in Figure 5 below.

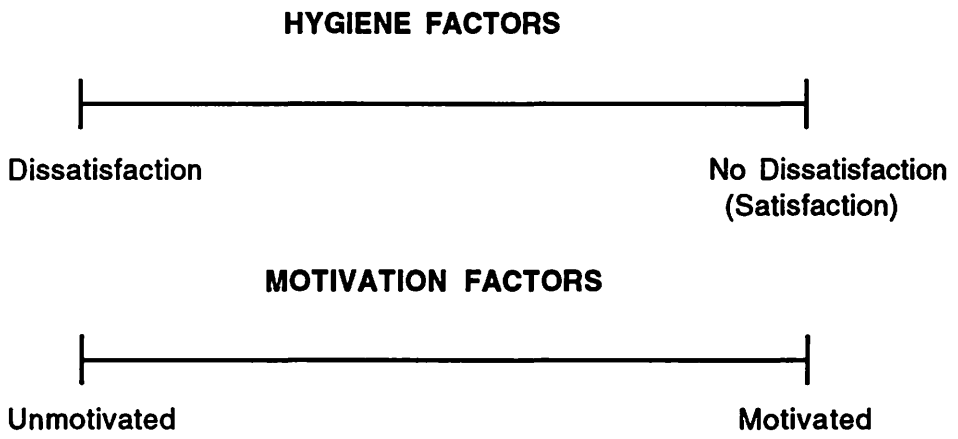

Figure 5: Herzberg's Dual Factor Theory.
Based on Petersen (1988)

Thus an organization must concentrate on both hygiene factors and motivation factors. If the organization does not pay attention to hygiene factors, Herzberg's research has shown that employees will be dissatisfied and will express this in ways that will be detrimental to the organization: grievances, decreased productivity, disloyalty to organization (Petersen, 1988, p.140).

If an organization does not pay any attention to the motivation factors, the best that can be expected is an employee who is not dissatisfied. These factors act to enrich the job, producing harder working, more committed, better performing employees.

An organization that puts all of its resources into hygiene factors

will produce employees that are non-complaining, but apathetic in their work, not striving for safety and performance. An organization that supplies mostly motivational factors and no hygiene factors will produce well motivated workers who build up an increasingly bigger grudge against their employers as time goes on - eventually leaving or losing motivation.

Questions 1 - 12 investigate staff attitudes to hygiene factors, while questions 13 - 24 investigate staff attitudes to motivational factors.

INTERACTION OF STAFF WITH ORGANIZATIONAL CLIMATE
(Audit, Part 1: Questions 25-35)

These questions are based on the principles of Participative Management.

Participative Management. Studies have shown that a participative approach to management results in a higher performance from all employees, who show improved attitudes, morale, turnover, etc (Petersen, 1988, p. 105,115,118). Workers want to be involved in decision-making where they feel they have a right to be involved. Through participation employees become active in the work place, less dependent on supervisors, view themselves as equals, and have self awareness and self direction. According to Argyris's Conflict (or Incongruency) Theory this is healthy as it is the natural state of adult life (Argyris, 1957). If someone is forced to behave in the immature state, which would happen in a hierarchical organization, Argyris believes conflict will arise. This conflict may cause staff to:

- quit
- become apathetic about their jobs
- lack motivation
- lose interest in the company and its goals
- formal informal groups
- cling to group norms instead of the company's
- evolve a 'mind-set' that the company is wrong in most things that it does.

The two conflicting states, as described by Argyris, are shown in figure 6 along with the management styles that produce them.

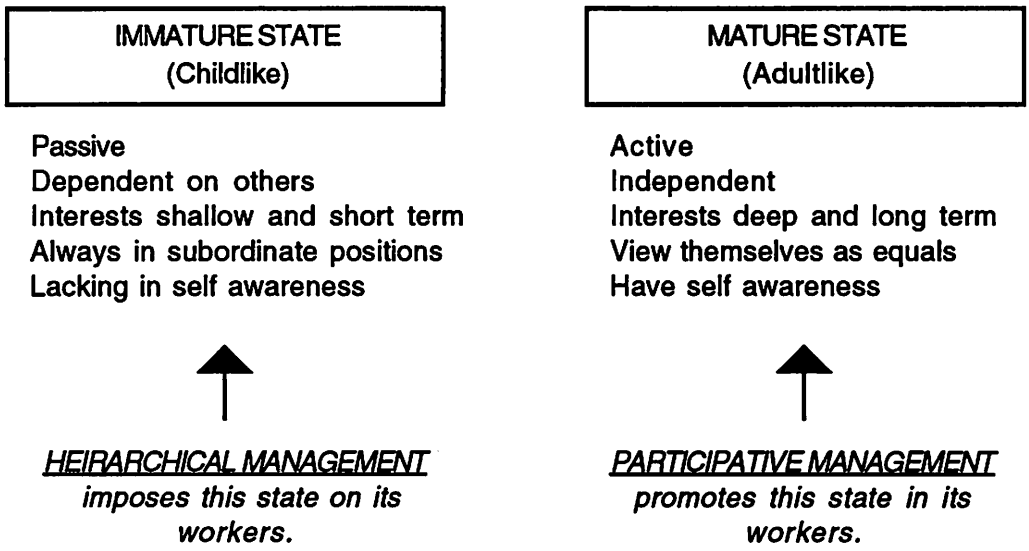

Figure 6: Argyris's Conflict States.

Based on the information in Petersen (1980)

The conflict staff feel may in turn lead to inattention, disregard of safety rules and a poor general attitude to the company and safety[1]. The normal hierarchical management reaction to this is more control, specialization and pressure! Argyris proposes "levelling" by group decision-making and group supervision. The emphasis is on involvement in the decision-making process so that perceptions of problems are sought, ideas on alternative solutions are cultivated, thoughts on implementing decisions which have already been made are solicited. Through this process group norms become company norms and vice versa.

This is further supported by the studies of Likert whose research showed that the tighter the control over the employee, the lower the productivity (Likert, 1967). The more punitive the supervisor is when the employee makes a mistake, the lower the productivity. He also supported

[1] NOTE: Other possible reactions to stress are shown in Figure 29.

the ideas of participative management through the principles of (1) the use of supportive relationships by the manager, (2) The use of group decision making and group methods of supervision, and (3) the manager's performance goals.

The first of Likert's principles is echoed in the theory based on research from behavioral science and known as Care Control (Petersen, 1980, p.123). It is built on the concept that if employees really believe that management personnel and their immediate supervisors are sincerely interested in them and their safety, they will perform in a safe fashion. In industry this has shown to greatly reduce accidents and their costs.

It should be noted that participative management does not mean that every employee has a vote in every decision. It does mean that every employee has the ability to have input into things that have relevance to that person. This is reinforced by the findings of Gausch who studied fifteen locations with 10,000 employees and made the following conclusions:

- It is not supported that an expression of strong participation (self control, group decision making, and reduced authority) will assure any improvement or be related positively to safety experience.
- It is not supported that an expression of strong authority (warnings, threats, reprimands and reduced participation) will assure any improvement or be related positively to safety experiences.
- It is supported that an expression of strongly balanced involvement tends to have respectable validity coefficient with improved safety experience (Gausch, 1973).

Thus questions 25 - 37 look at the attitudes the staff hold to the climate set by the management of the organization in terms of a participative approach. More specifically:

Supportive relationships (care control) 25 - 31
Group decision making 32 - 35
Manager's performance goals 36 - 37

STAFF INTERACTION WITH THE SAFETY SYSTEM (Audit, Part 1: Questions 38 - 46)

Whereas in the previous section attitudes of staff to general organizational climate were measured, in this section special emphasis is placed on attitudes towards the safety system. This is because if the safety system portrays an inappropriate image, reactions from staff are

more likely to be directed to inappropriate safety behavior. The way the worker sees the safety program strongly influences not only behavior on the job but ability to learn from and to respond to safety materials. The purpose of this group of questions then is to determine if the employee's perception of the safety program climate is the same as the employer's, and if the climate is appropriate.

These questions go further than simply addressing participative management. They are designed to gauge staff attitudes to the level the company is carrying out safety by objectives (S.B.O.) in a participatory style (see figure 10).

Safety by Objectives is based on the principles of Management by Objectives originated by Douglas McGregor (Petersen, 1988, p.274). S.B.O. is considered essential in today's safety programs because it brings these qualities:

- Goal directed behavior
- Organization-wide method of allocating responsibilities for the corporate goals
- Fosters participation in goal setting and decision making
- Provides current, quick, regular feedback and reinforcement
- Sponsors planning at all levels
- Measures results while allowing freedom of decision and of action at lower levels
- Fosters imagination and creativity in even the largest organizations.

Thus S.B.O. should be a part of any goal-oriented, high performance, participative organization.

Questions 38 - 40 measure goal setting and communicating
Questions 41 - 42 measure participative methods
Questions 43 - 44 measure feedback and reinforcement
Questions 45 measures training outcome.
Question 46 is to give a general impression of the staff's attitude towards the organization's safety program and is related to general company types identified in a study by Social Research Inc. in 1962 (Levy, S. & Greene, S. 1962).

QUALITATIVE MEASURES (Audit, Part 1: Questions 47 - 55)

This section of questions was included to gain some qualitative feedback from staff on the state of the safety program as it affects them. It is based on the premise that the people who are continually in the field are the most aware of issues that need addressing, particularly concerning immediate risks.

Questions 47 and 48 should produce the greatest motivational 'Turn-on" and 'Turn-off' respectively according to Herzberg's factors, for the individual staff member. Question 49 and 50 are asking for staff's input on changes to make and how they would like to see things changed. Questions 51 and 52 address the interaction of the staff with the environment in which they work. Staff are often most aware of dangers that exist in the work place. Questions 53 to 55 are concerned with monitoring systems that should be in place.

PAST FACTORS.

The last part of the questionnaire is an attempt to measure the stress factors that individual staff members have built up in their immediate past due to change experienced in everyday life. The accumulation of stress has been shown to be linked to illness and proneness to accidents. The tool shown is the Social Readjustment Rating Scale (S.R.R.S.)(Holmes and Rahe, 1967).

This tool has been shown to produce a statistical relationship between score and illness and injury experienced (Petersen, 1988, p.298):

100 units scored within 12 months = 37% likelihood of serious illness or accident

200 units scored within 12 months = 51% likelihood of serious illness or accident

300 units scored within 12 months = 79% likelihood of serious illness or accident

PART TWO: Audit of the Safety System.
(Method of auditing = checklist audit with weighting)

The safety system operating within any program is audited in relation to contemporary standards within other industries. Three major principles are used as measures of contemporary practice:

- quality management
- systems safety
- multiple causation

The last two principles are explained later in this chapter, as they relate to specific groups of questions. Quality management principles are more global in their application and will be discussed briefly here.

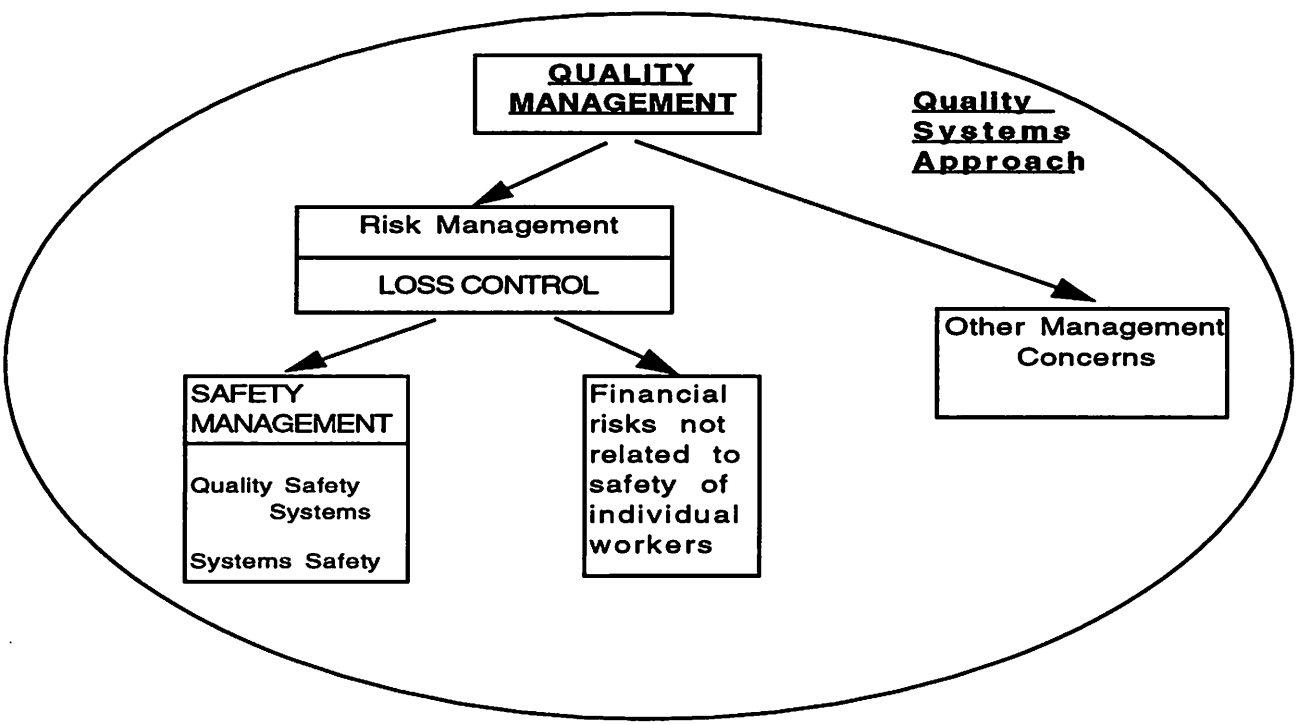

Figure 7: Contemporary Safety Approaches 1992.

Figure 7 is a model representing the relationship between various components of a contemporary approach to safety management . The

universal set is the Quality Systems approach of the organization to all of its management issues. Here the principal philosophy guiding the performance of the organization is the quality of its products or services. This follows a worldwide trend towards more stringent customer expectations with regard to quality and accompanying this has been a growing realization that continual improvement in quality is necessary to achieve and sustain good economic performance (S.A.N.Z., 1987).

Quality management is the implementation of the quality policy that guides the organization. The attainment of desired quality requires the commitment and participation of all members of the organization, whereas the responsibility for quality management belongs to top management. The management therefore sets policy, and from this its goals and objectives are determined. Quality systems are set up to ensure that these objectives are met. A quality system takes the form of organizational structure, responsibilities, procedures, processes and resources for the implementation of quality management. An essential part of the system is quality control and assurance processes to provide feedback and monitoring on performance being achieved in reaching the quality objectives. This participative approach to management and responsibility ensures the most effective and efficient use of the human resources within an organization.

The one aspect of the organization we are particularly interested in is the Risk Management or Loss Control department. These two terms can be considered interchangeable for our purpose, and entail the responsibilities for preventing and minimizing losses (financial, property, physical, etc.) Viewed from a quality systems approach, people in these departments are tasked with the job of ensuring a quality safety program is in effect at all times, and monitoring the implemented standard through quality control processes.

In adventure education the responsibility of managing risks is most often referred to as the safety department or committee, but it must be realized that the wider concept of risk management also includes risks such as insurance and protection from litigation, etc. Thus when protecting a client or staff member safety management is used and when protecting the organization risk management applies (Priest & Dixon, 1990).

A quality system is set up to ensure the quality of the safety program. The component parts of the organizational structure that a quality safety system would include are represented in Figure 8 (simple) and Figure 9 (expanded)

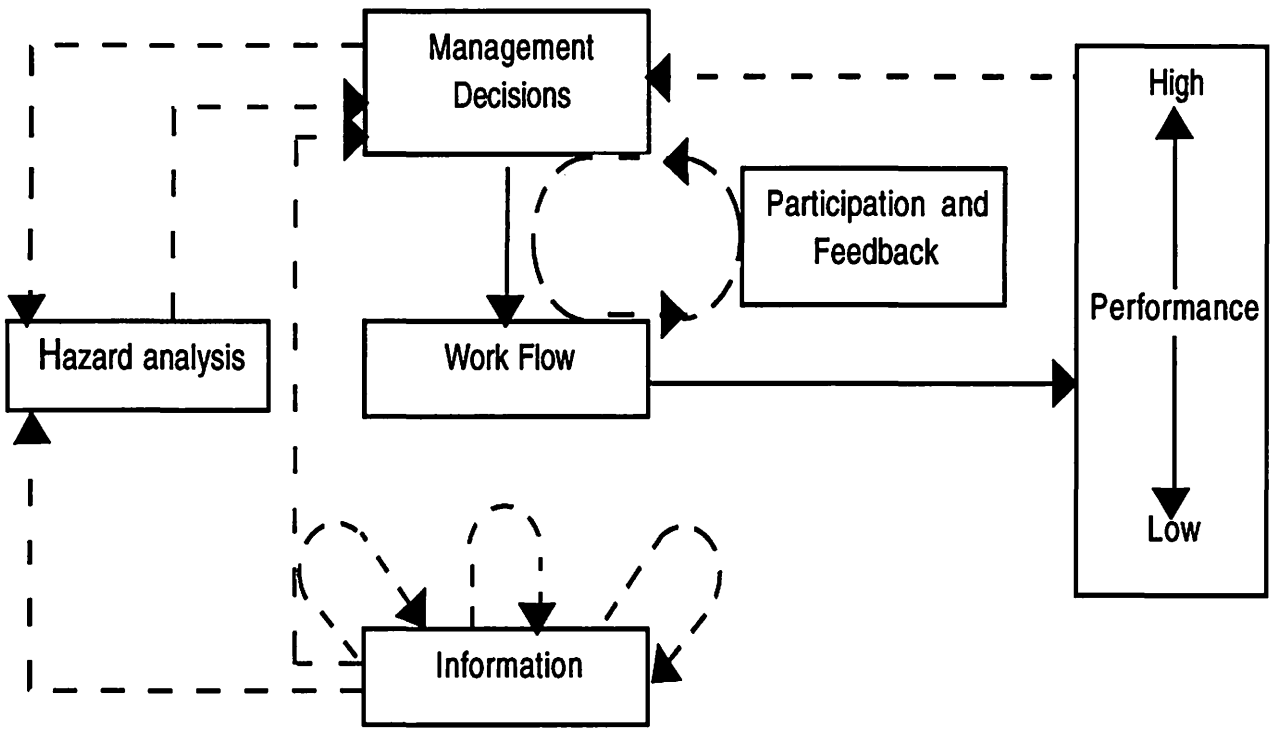

Figure 8: Safety System Congruous with Goal-Oriented, High Performance System (simplified version).
Six Elements of a Safety System by W.G. Johnson (Petersen, 1980, p.56)

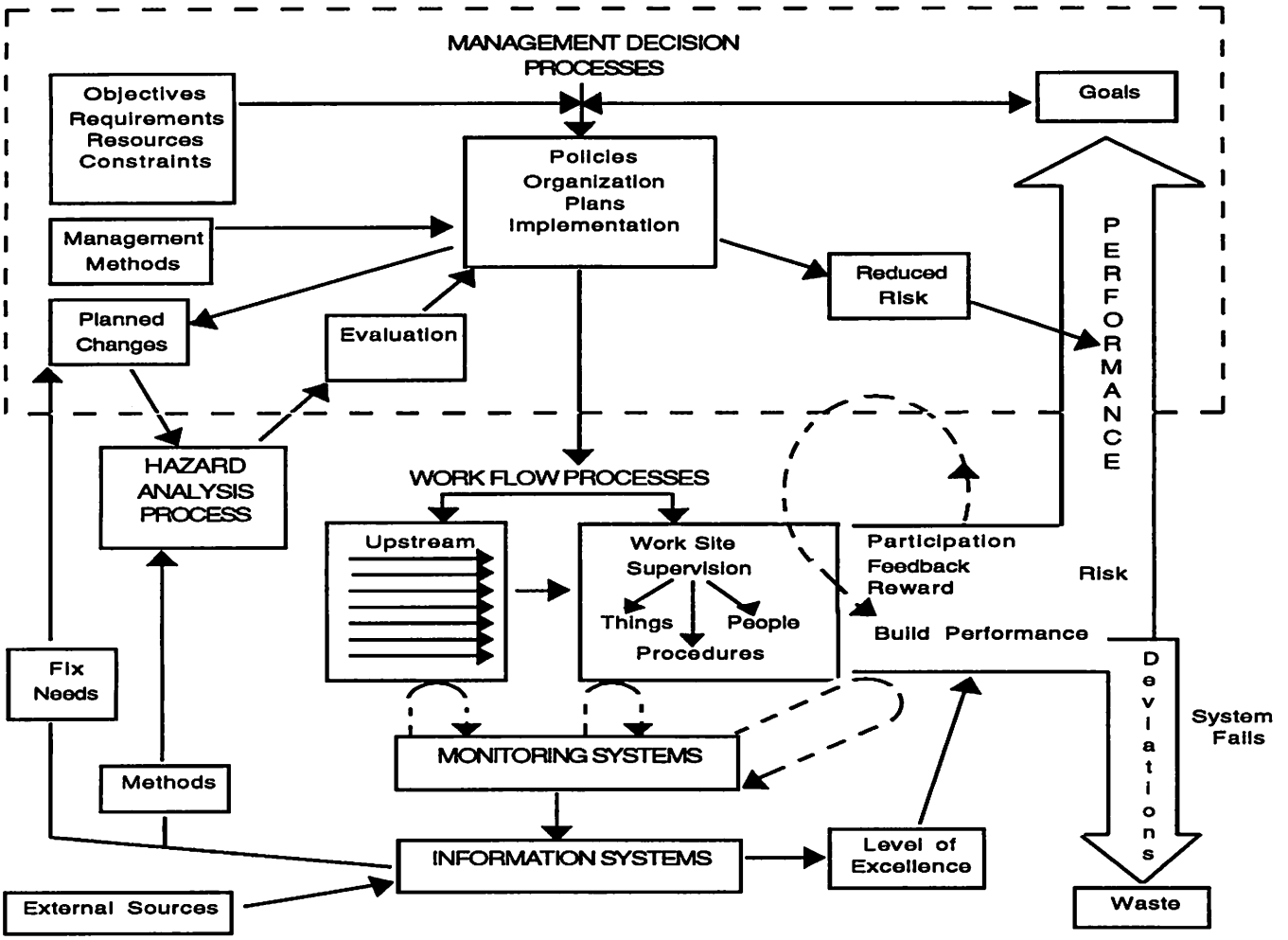

Figure 9: Dynamic Safety System - Congruent with Goal-Oriented, High Performance System.

Safety System Flowchart by W.G.Johnson (Petersen, 1980, p.57)

This gives the rationale for the main categories under which Part 2 of the audit is grouped:

1) Management Decision Processes
2) Work Flow Processes
3) Hazard Analysis Processes
4) Information and Monitoring Processes (including performance).

A) MANAGEMENT DECISION PROCESSES:

These processes are represented by the following audit categories:

- 1. Goals
- 2. Accountability
- 3. General communication
- 4. Safety protocols
- 5. Selection of staff
- 6. Staff conditions
- 7. Emergency preparedness
- 8. Resources
- 9. Liability

1. Goals: Goals must be developed and communicated in the areas of both educational outcomes and safety outcomes. In this way staff realize the close interaction between the two factors, the balance required between the two, and the value that management places on safety and educational outcomes. The final product being a quality educational experience for the students in a safe environment.

From these goals realistic safety objectives need to be set. In setting these it should be remembered that no matter what the standard of the safety program, there is no way for all uncertainty and therefore all risk to be removed. People will attend programs with undisclosed or unknown health problems, other people's driving can cause accidents, or freak environmental hazards may occur, to mention just a few. Thus setting objectives which aim for no fatalities or injuries is unrealistic and setting the organization up for failure in reaching the objective(s). More realistic is the approach of setting accident levels equivalent to those encountered in everyday life. This is ethically defendable as society can't expect a better safety record in adventure education than in the normal practices of living. One study puts this level at 0.4 fatalities and 30 reportable injuries per million participant hours (Ewert, 1984).

2. Accountability: Without well understood accountabilities performance appraisal can't be undertaken. One of the essential tasks of management is to reach agreement with staff over performance objectives and criteria. These objectives are a key part of the Safety by Objectives cycle talked about in Part 1, and illustrated in Figure 10. S.B.O. is one means to help implement a quality management approach. Objectives set should be related to the production of quality product, rather than increasing production quantity.

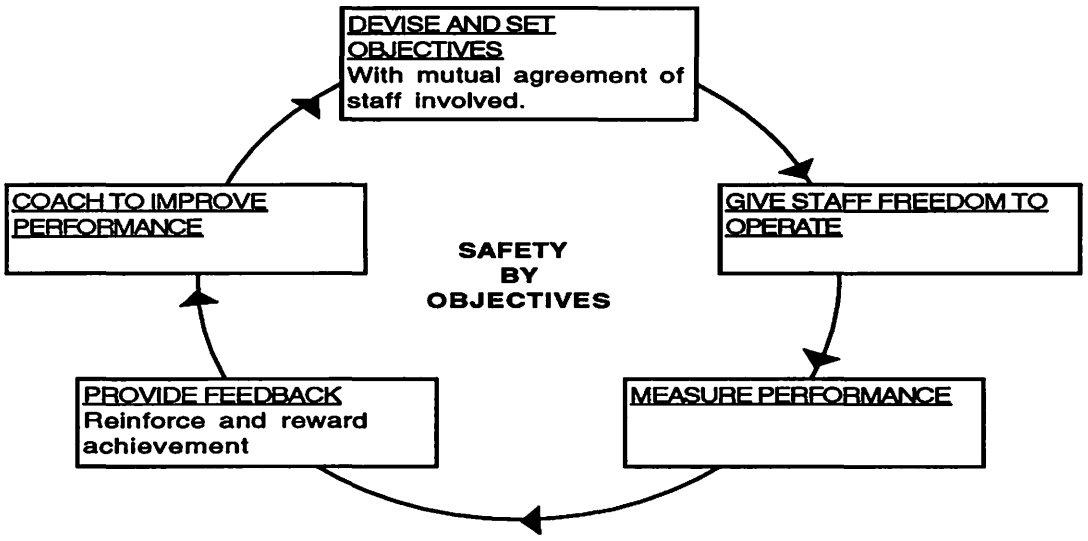

Figure 10: Safety By Objectives. Based on Petersen, 1980, p.124.

It is important that all levels in the organization have a role to play in safety and that all levels are held accountable for their performance. The various roles that are to be played, and the amount of involvement in each role at the various levels is represented in Figure 11.

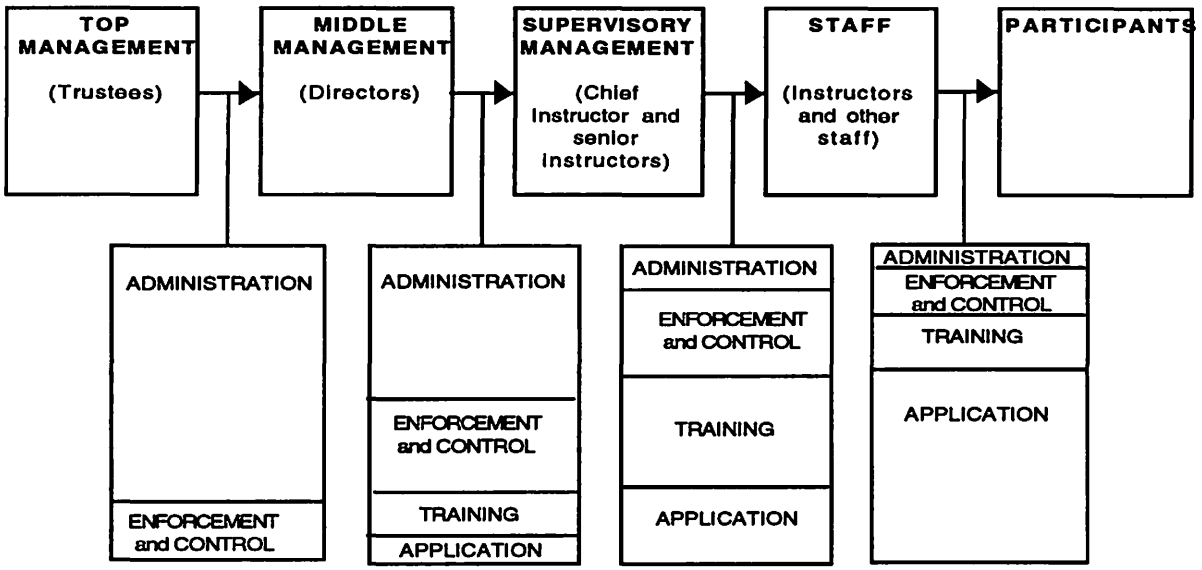

Figure 11: Roles of various management levels in the adventure education safety program. Based on Planek, 1967.

It is widely considered that the safety effort should be led by a committee which has input from all levels in the organization. This committee should be monitoring changes occurring within the safety program and keeping the top management team informed of key changes.

At the middle management level a safety officer should be appointed so that the safety effort has a focus in the daily running of the organization. Delegation of tasks and performance checks will be the responsibility of this officer.

3. General Communication: This section checks the level of communication and participative management occurring within the safety effort of the organization.

4. Safety Protocols: Staff need to be aware of the rules and guidelines under which they are expected to be operating; whether these are organizationally determined or legislated. Rules or policies serve an important role. They are a risk management technique specifying a single option for a given set of conditions. They are useful when other possible options are considered to leave too great a latitude for unfavorable outcomes. For example if a certain environment is considered too dangerous to enter in a given set of circumstances, a rule may be put in place forbidding entry under those circumstances. This situation can be visualized as too great an overlap in the two sources of hazards shown in Figures 12, leading to an unacceptably large accident potential.

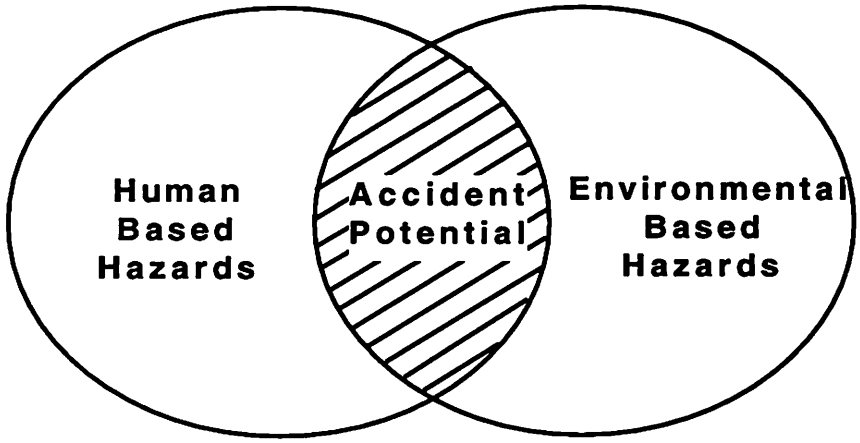

Figure 12: The accident equation. From Hale, 1984, p. 4

Figure 13 shows the effect of a rule on the accident equation. A rule acts to prevent humans from entering the environment that has been found to produce the accident, therefore preventing any potential of an accident occurring from that source.

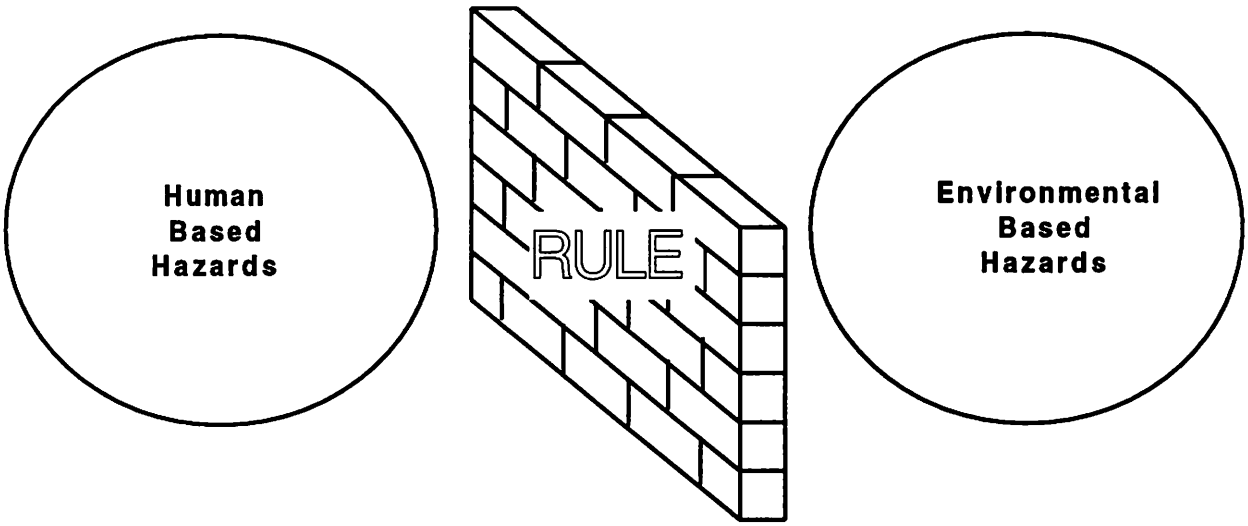

Figure 13: Effect of a rule on the accident equation. From Hale,1984, p.10

The other important use of rules is in disclosing a procedure, use of equipment, ratio of staff to students, etc., that would be considered negligent if not complied with.

Rules should act as stress eliminators. They should relieve all levels of staff of daily policy decisions in set circumstances. They should protect both the instructor and the participants from being placed in situations that are of potential danger.

In some adventure education organizations rules may be acting as stress creators. This may be because the rules are so broad in scope that they apply to situations that can be controlled by other management techniques safely, or simply lack of understanding of the need for the rule by the instructors. Consider the case where an organization finds students crossing a certain river are getting cut feet (Hunt, 1984). A manager may impose a rule stating, 'boots shall be worn on all river crossings'. The instructors, who are employed for their ability to make sound judgement, are placed in a difficult situation when confronted with a shallow, sandy bottomed stream that has clear water. The students

don't want to get their boots wet, and realize it is perfectly safe to cross without shoes. The only justification the instructor can give is that it is against the rules. Rather than do this, the instructor might choose to disregard the rule. In this way the 'legislative manager' has put the instructor in a stressful situation; choosing to disregard an organizational rule and all that means, versus carrying out an action which judgement states is plainly ridiculous. The situation could be avoided by more careful wording of the rule, 'sturdy footwear to be worn in fast flowing rivers, rivers with uneven beds, or where the nature of the river bed is obscured by discolored water.'

A test for rules then is that they should only apply to situations for which other management techniques are not appropriate. This leaves instructional staff empowered in the field.

For the same reason of empowerment, or ownership and understanding, instructional staff should be involved in rule making, and have channels to question existing rules.

Rules should be arrived at through various information channels. The most common, and least appropriate, is retroactively through reaction to an accident that occurs. Preemptive techniques such as near miss analysis and hazard identification processes are to be favored.

Guidelines should be the accumulated knowledge gained by staff to their local conditions or equipment. Using these a new instructor could quickly learn what to do or watch out for in this new environment. Guidelines are another good method of setting staff up to succeed rather than letting each new staff member learn by experiencing failures that others have already had to deal with.

The consequences of disregarding a policy/rule or guideline need to be clearly stated so there is no confusion between staff and management.

The safety protocols need to be communicated in a clear, easy to read document. It is a crucial link between the safety goals of the organization and the instructional staff.

5. Selection of staff: As already stated the final safety level within any adventure education organization depends on the ability of staff to make quality decisions in the field. Recruiting and selecting appropriate staff are the first steps in the process.

In order to know what skills the staff need to possess, various jobs they are required to carry out as part of their duties need to be

systematically broken down into the requisite skills needed to satisfactorily perform them. The skills applicants bring can then be compared objectively against this list. The importance of this process is highlighted when attempting to gain gender or ethnic balances in staff. The most skilled applicant may not get the job, but they are still required to meet the skills listed, along with the other aspects they can bring to the organization.

Research into links between accident rates and employee-related variables have revealed statistically significant negative correlations for:

- married versus single staff
- older versus younger staff (accident rate peaks at age 21 then steadily declines. Rates were found to be 2.5 times higher in ages between 20 - 24 than older ages)
- staff who have a longer work history related to the job

Positive correlations between accident rated and employee-related variables have been found for :

- slow motor skills (in some jobs)
- sensory impaired (in some jobs)
- irresponsible, maladjusted and moody individuals
- males (more than twice the rate of women)
- those who use alcohol and drugs.

No correlation has been found for:

- intelligence
- mechanical ability

(Mintz & Blum, 1949; Schulzinger, 1956; Shafai-Sahrai, 1973).

Thus, the factors we can legitimately screen for, without discriminating against sex and marital status are age[2], physical condition and experience. We may also be able to screen out a very small percentage of the population who are 'accident prone'(< 0.5%) by finding out about accident history. This factor is much less significant than age however. On the positive side we also need to ensure the staff member is able to communicate clearly and establish respect with the students: be an effective educator.

How to screen is also an important issue. An application form and written summary of experience and qualifications is a start. Interviews

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[2] In some countries it may be considered discrimination to select using age as a factor. If this is the case question 5.5 of Audit Part 2 should be eliminated and more weight placed on the scores of question 5.6.

are commonly used but research suggests they are generally invalid. This is because interviewers' biases and stereotypes invalidate them (Petersen, 1988, p.200). Interviewers develop a stereotype of a good candidate and seek to match interviewees with stereotypes. They seek data to support or deny hypotheses and when satisfied turn their attention elsewhere. Contacting referees, especially if they are personally known by you, can inform of an applicant's past history. However there is no proof that this is in any way indicative of future performance under a different set of circumstances. Skill tests can be used to demonstrate certain skills under generally artificial conditions. An internship is probably the best means to screen applicants - especially over a good period of time - and fairest for the applicant in terms of being able to demonstrate their abilities. It will also give insight into how the individual fits into the unique corporate climate. The drawback is time (and therefore money) for both the applicant and organization, especially if there are many applicants.

6. Staff Conditions: This category tests how the organization is catering for Herzberg's hygiene or dissatisfaction factors. Burnout is a common phenomenon in adventure education. The energy that instructors must put into successfully motivating, counselling and supervising their students is enormous. Often organizations reward this work with poor pay, long hours and bad living conditions. This results in overloaded staff and results in decreased levels of concentration and therefore decreased safety.

An unfortunate fact about the adventure education industry is that organizations sometimes play on the motivation that young people have to get work in the industry. These younger folk in particular are considered by some to be fair game to work hard and reward little. When these instructors 'burn out' they can easily be replaced with new zealots. The industry should be beyond that stage now and adopting a responsible attitude to work conditions.

Pay is left off the list to check as it is too subjective a topic and sufficient indication of acceptability is given in the staff attitudes survey.

7. Emergency Preparedness: An important part of any risk management plan is preparing for when and if the worst happens so that it

is possible to minimize the consequences by dealing with the situation efficiently. When a crisis occurs those who have to deal with it, whether instructors in the field, or secretaries answering a phone call about an accident, will be stressed. The stress level can be visualized as in Figure 14 for the various stages of the incident. At the onset of the incident the individual responding experiences a high level of stress, and this is maintained as various solutions are tried.

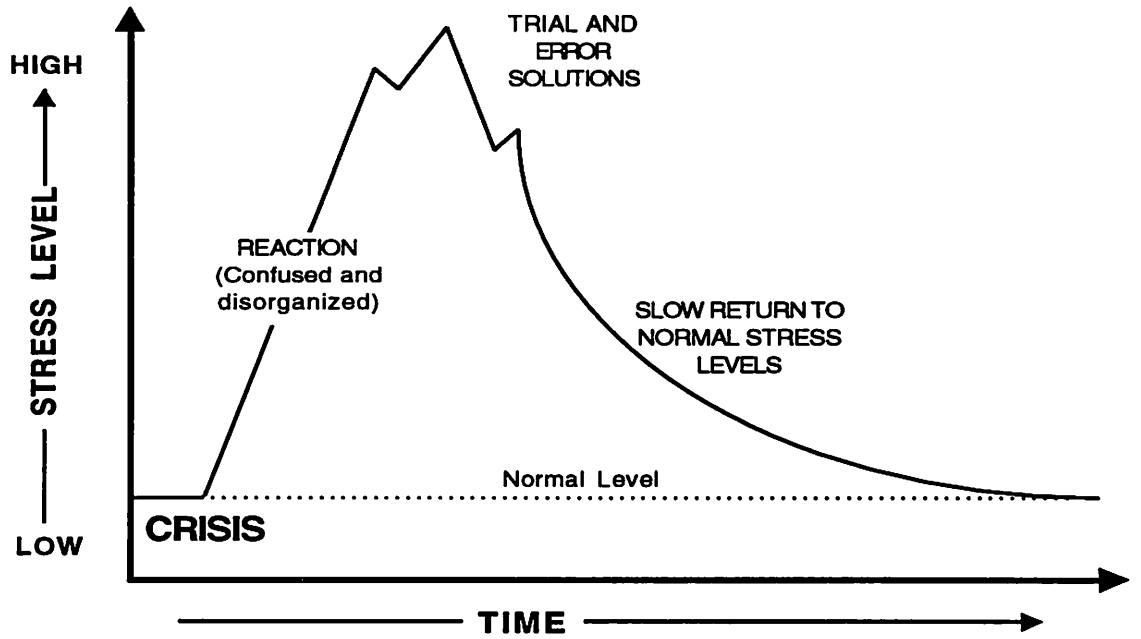

Figure 14: Profile of a crisis. From Raffan, 1988, p.4.

These high stress levels, caused by the reaction to the crisis, can lead to poor performance in handling the stressful situation. This is diagrammed in figure 15. This figure shows that a small amount of stress can lead to an increase in ability to handle the situation (due to focussing on the problem), but too much stress leads to the individual's performance deteriorating rapidly until that person may not be able to respond at all (flooding).

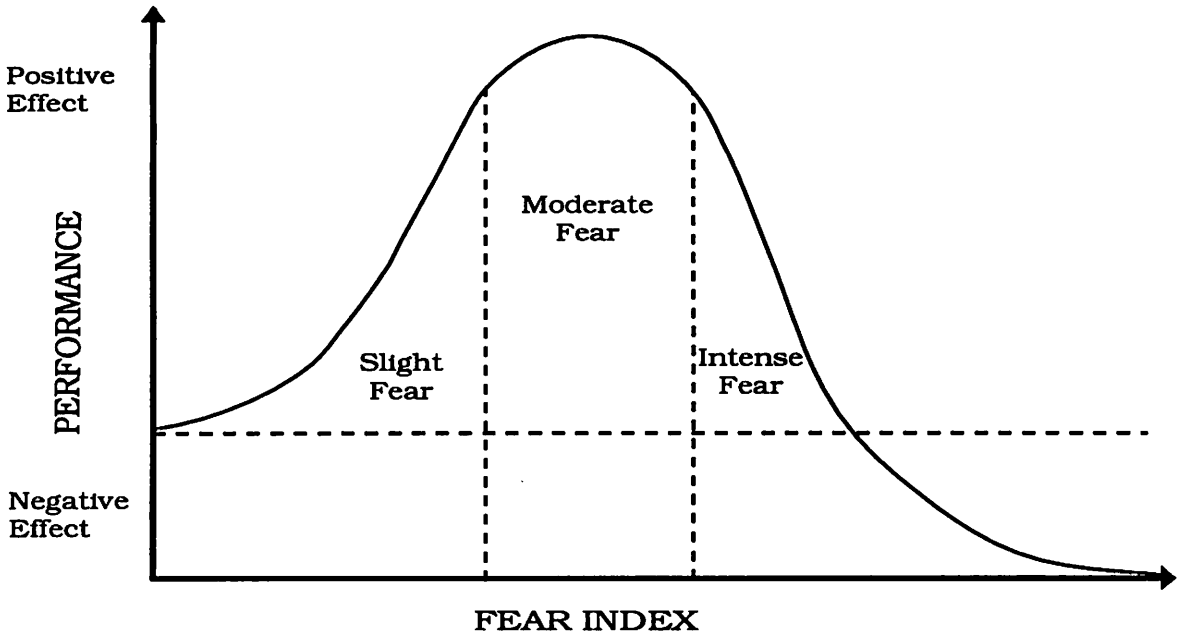

Figure 15: Performance as a function of level of fear. From Ewert, 1985, p.11.

With the poor performance due to high stress, and the extra time taken in trying different possible solutions, the damage caused in an incident both physical and emotional can be increased significantly. The best way to deal with this is to have prepared plans that people can follow in the event of an emergency. This will lead to a lower stress level in the emergency as people know what they are doing is right, and a faster response time. Together these two factors will act to minimize damage. The effect of this controlled response, utilizing an already practiced plan, in a stressful situation is shown in Figure 16.

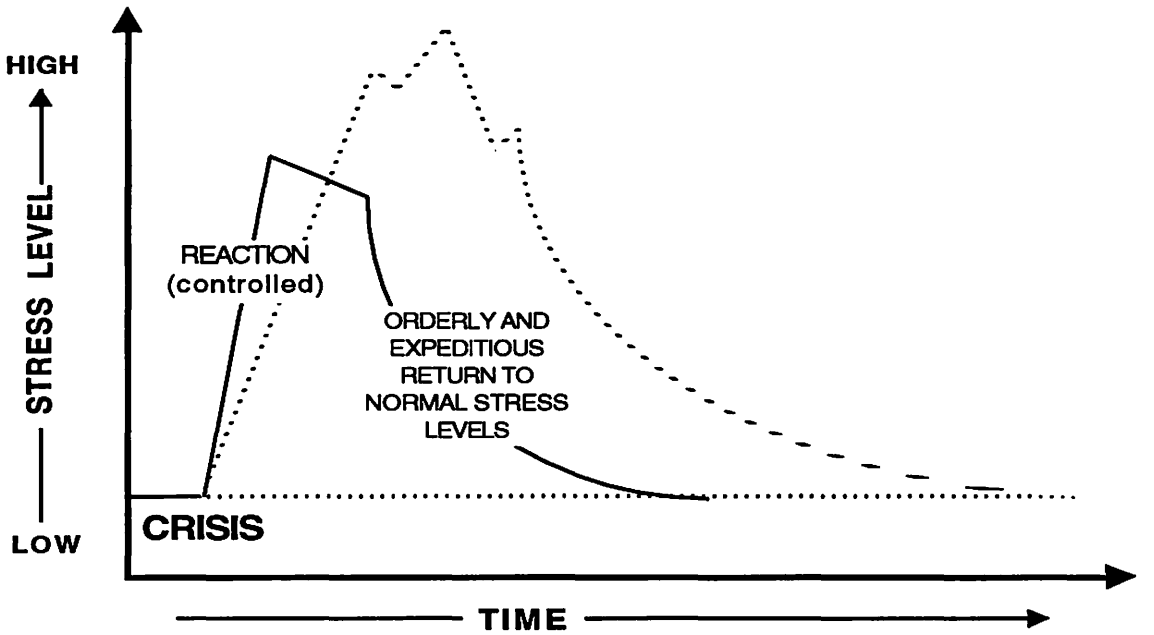

Figure 16: Profile of a managed crisis. From Raffan, 1988, p.4.

The emergency plan must cover the range of possible incidents that could be dealt with, provide a well thought out plan for each one, have someone available to carry out the plan, and have resources available. Each of these plans should detail who to contact in the organization, including all top management (trustees), as these people may be contacted by the media for comment and should be prepared.

8. Resources: This category needs little explanation. In order to ensure quality equipment is available it needs to have a programmed turnover period. This aspect is further addressed when each equipment type is inspected later in the audit.

For an organization to cover itself against financial loss due to theft, fire or civil disasters it must carry an up-to-date inventory and insure items at replacement value.

9. Liability: [3] Legal liability is a complex issue and interpretation of the law, and the possibility of civil versus criminal proceedings able to be brought against an individual or an organization differ from country to country, and change with time. The auditor should become acquainted with the situation in the locale in which they are carrying out the audit.

All liability claims of concern to adventure education programs are liability in tort or wrongful death arising from negligent acts. Negligence can be either malfeance (where a standard of care owed was delivered but not of suitable standard) or misfeance (where the standard of care owed was not delivered at all). There are four elements necessary for negligence:

(1) a duty was owed by the person in charge to protect the participants from undue risk of injury.
(2) there was a failure to provide the standard of care required.
(3) there were damages to the participant.
(4) the breach of duty caused the damages.

A successful negligence case will have to prove all four points.

There is no doubt that a duty is owed the participant in adventure education activities. The standard of care required is measured against a "reasonable and prudent professional". This infers a skill level and practices that are contemporary and expert. It also infers adequate supervision at all times, quality equipment, activities that take into account the physical and mental capabilities of the student and that these activities are taught by means of a suitable progression. Finally, the risk undertaken must be appropriate to the educative objectives set. These aspects are checked elsewhere in the audit.

A common method used to protect against liability suits is to have participants sign releases or waivers of responsibility. These are based on the legal principle of "volenti non fit injuria" which may be translated to "no harm is done to one who consents". These forms are an attempt by the organization to transfer the responsibility of risk to the participant. It must be understood however that signing these forms does not take away the rights of the individual. A person can not agree to take responsibility for risks that they do not begin to understand and appreciate. Nor can participants accept responsibility for hidden risks. Thus for releases to be most effective the risks have to be explained

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[3] The information in this section is based on the work of Betty Van der Smissen 1980 & 1987.

carefully to the participant so that they understand them, the participant should be given the opportunity to ask questions, and then activities have to be entered into voluntarily. For novices to adventure education activities, and minors, and intellectually impaired individuals in particular, their ability to assume responsibility for the risk is extremely doubtful because they have no understanding of the nature of the risks involved. However the release form acts as a good means of disclosing the potential risk to these people or their guardians so that they are more educated. For an adult improving skills in a particular activity, willingly taking part in that activity of which they have previous experience, the assumption of responsibility is much clearer.

This does not release the organization from its responsibilities towards negligence however. A standard of care is still owed, quality equipment is still expected, instructors need to be trained and qualified, emergency procedures need to be planned and activities supervised.

B) WORK FLOW PROCESSES.

These processes are represented by the following audit categories:

- 10. Staff orientation
- 11. Staff training
- 12. Programs
- 13. Screening participants
- 14. Medical program
- 15. Personal equipment

10. Staff Orientation: The orderly, structured and progressive introduction of new staff into the organization is critical. It generally takes considerable time for someone to familiarize themselves with local conditions and equipment, let alone the intricacies of a new safety program. The staff member needs to personally meet the middle managers in order to open communication channels and be introduced to the participative style. Enforcement of management's quest for quality in the safety program needs to start with management. The safety program then needs to be introduced from educative goals down, and checks made for understanding of what is expected. Providing a mentor in the form of an experienced member of staff is an important consideration especially for larger organizations. This provides a formal resource rather than stress being placed on the new staff member in finding someone with the time to answer questions.

Equally, when a staff member changes roles, or begins working on a different program there should be an orientation period. This will generally be shorter in duration but should allow review of risk management plans and a staged assumption of responsibility for the group. Thus, for team teaching, a more experienced staff member would be in charge or, if solo instructing, close supervision of plans and activities would be carried out by a senior member of staff.

11. Staff Training: Not only are suitable training levels important in terms of attaining a quality product and meeting requirements for standard of care owed participants, staff training itself can also be a strong motivating factor for the employee in the work place if organized well. This part of the audit assumes a goal-oriented approach, where the employee and some member of management agree to the training requirements of that individual staff member and how they will be achieved. The goals need to be related to the job and achieving a better quality of product. This is made possible by having a complete list of skills for the various jobs in the organization. The employee can therefore focus on improving in the current job or working towards gaining skills in order to carry out a different job, or run different programs in the same organization. Gaining and updating professional qualifications is an important aspect of remaining contemporary in the professional field.

A technique much favored in industry for training is observing positive role models. Thus a great form of training in the adventure education field is to allow staff to observe others, preferably experienced senior staff, operate with groups and so learn new approaches and techniques for situations.

Training should be an on-going process for all staff, no matter what their level or longevity with the organization. Studies have shown that one of the most important aspects in an organization's safety effort is management's participation in the program by role modeling behavior. Thus management's participation in group training programs and in goal setting shows commitment to the rest of the staff.

Studies have shown that the causes of severe accidents are different than those of frequent accidents and are predictable in certain situations (Petersen, 1988, p.12). These situations include:

- Unusual, nonroutine work: normal controls that the organization has

adopted have little effect in nonroutine situations.
- Nonproductive activities: maintenance, research and development; where there is little supervision or safety effort.
- Sources of high energy: in the adventure education field this can be height, moving snow, moving water, high speed, etc.

For this reason these areas are signalled for special attention in training, and driving is separated further from the high energy category because of the ability to forget about it and the potential to lose a whole group in one accident. The company should have a comprehensive defensive driving program in place.

12. Programs: This category is fairly self-explanatory. The first question implies a check on management who accept contracts. Do they try to bend their own safety rules from the top, and thus stress the operational staff, by taking large groups for example?

Route plans and intentions are important for emergency planning. Communication systems are a very subjective matter. Many organizations make the carrying of radios mandatory when a certain distance from a roadhead. For organizations with skilled staff, whose mission involves teaching self-sufficiency in wilderness backcountry techniques, dependence on radios for emergencies may be inappropriate. This will be for the auditor to judge in relation to other hazard identification and reduction processes in use.

13. Screening Participants: In order to provide a standard of care suitable to the participants, it is necessary to have certain base information about them. This category checks that adequate information is obtained and available to those who need it.

14. Medical Program: Here the quality of the emergency preparedness of the organization is checked in terms of medical knowledge and basic equipment.

15. Personal Equipment: The quality of equipment available to both staff and students will directly affect the quality of the program run. Both groups need to be aware of the equipment they are to provide, have alternatives for getting it and have it checked for adequacy.

C. HAZARD ANALYSIS PROCESSES:

These processes are represented by the following audit categories:

- 16. Analysis of current activities
- 17. Analysis of planned changes
- 18. Analysis of new programs

Safety management theory has progressed substantially in the past 50 years. Traditionally organizations used what could be termed functional safety. A procedure was tried and used until something went wrong with it. Its function was looked at for the mode of failure, changes were made and the procedure put back into the work place. This fly-fix-fly approach to safety is illustrated in figure 17.

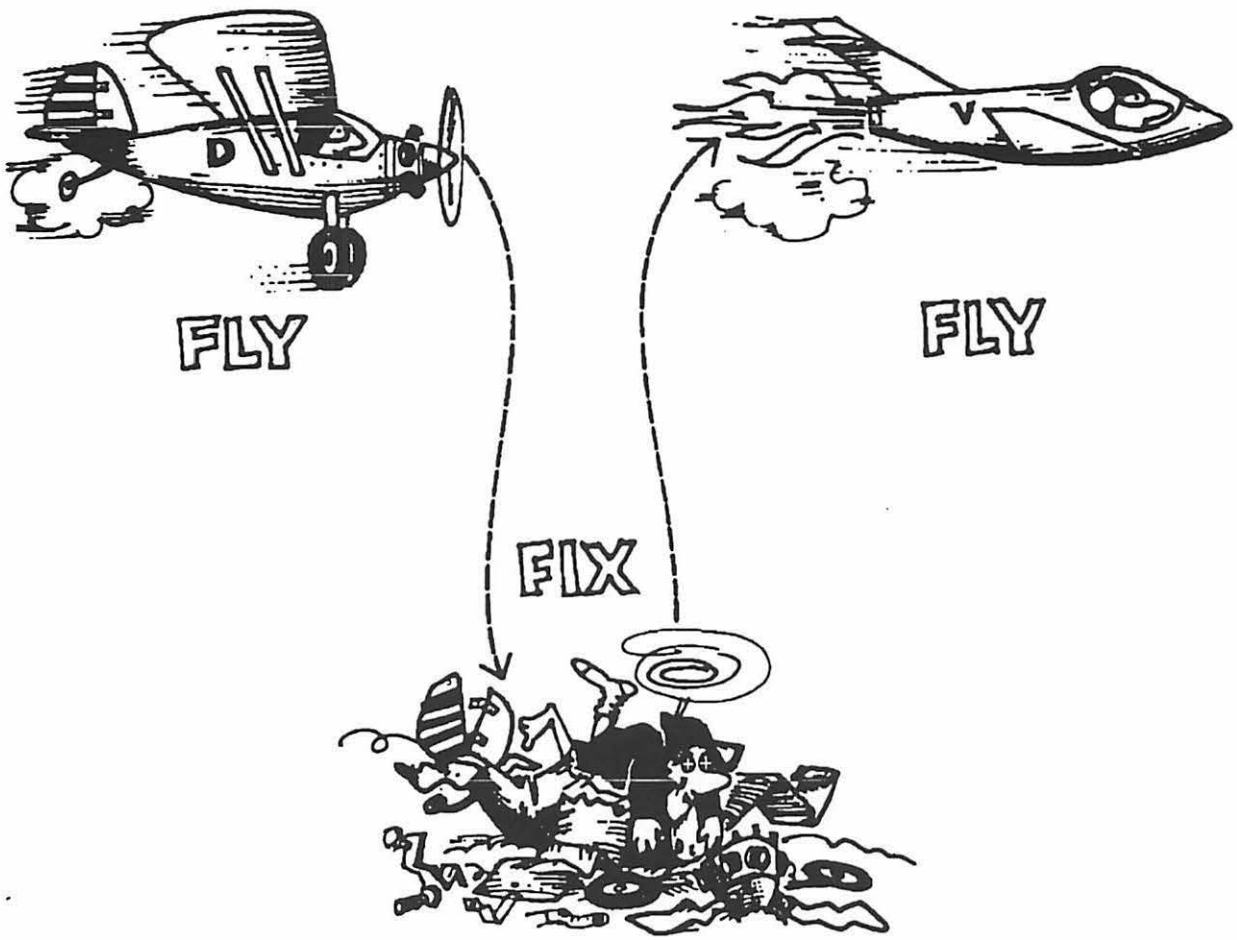

Figure 17: Functional safety: the traditional fly-fix-fly approach.
From Roland, 1983, p.10.

With the introduction of certain products and procedures such as nuclear bombs, nuclear power stations, space exploration and so on, the possibility of failures became unthinkable because of the possible losses involved. Thus the traditional functional safety approach could not be used with these projects. A new approach to safety management was created - systems safety. In systems safety the emphasis is placed on analyzing the entire life cycle of the project or system for potential hazards before the project is undertaken. All possible risks or failure points are identified at each stage from conception to termination and dismantling. If the risks can not be reduced to an acceptable level, or the cost of doing so is too great, the concept is changed and the project not started. The life cycle of a system is represented in figure 18.

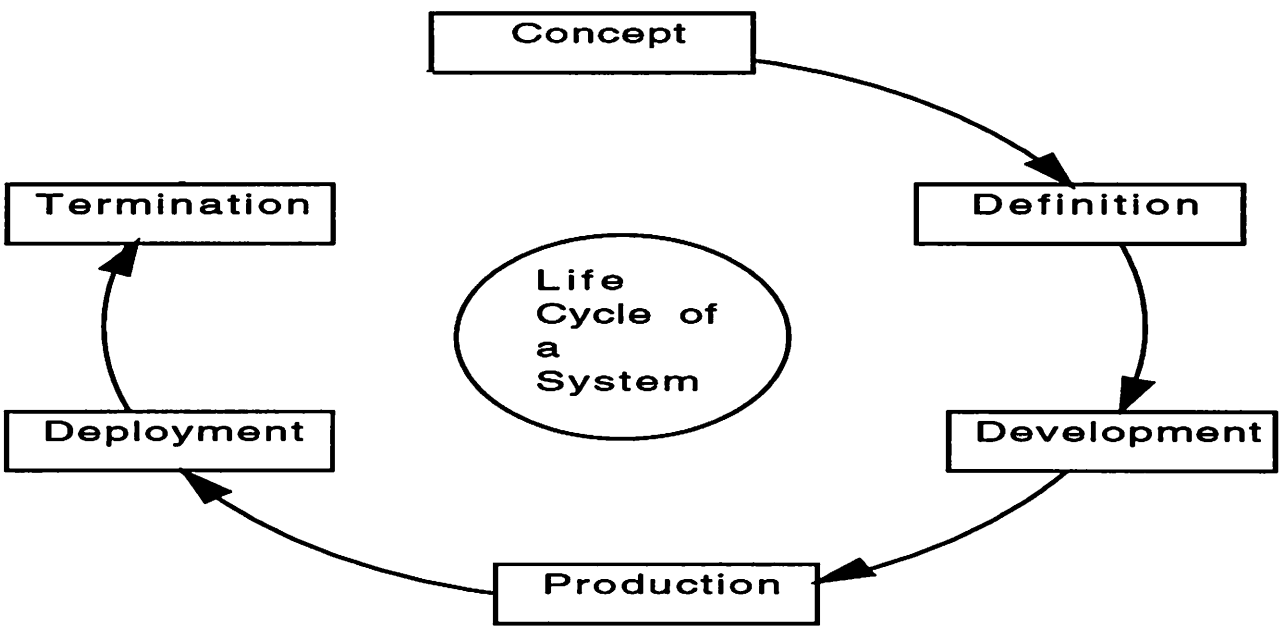

Figure 18: The Life Cycle of a System.

In adventure education we are dealing with human lives and potential injuries affecting quality of life. A fly-fix-fly approach to safety is not an ethical or professional approach to human safety. Therefore an organization should be adopting systems safety tools to analyze all programs for risk before the programs are tried on actual participants.

Systems safety offers a range of possible tools including deductive methods such as Fault Tree Analysis, and inductive methods such as Fault Hazard Analysis and Failure Modes and Effects Analysis[4]. Any of these methods will work in the adventure education setting although they take significant training to use properly. A method of analysis which could suit the thinking of adventure educators is that contained in part 3 of the audit and termed Risk Analysis and Management System (R.A.M.S.).

Whatever system an organization uses it should take into account the five components of a risk assessment model outlined in figure 19.

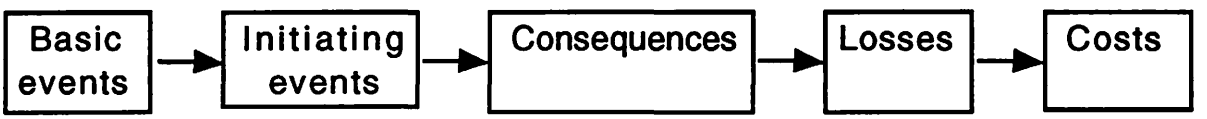

Figure 19: Risk Assessment Model. (Roland, 1983, p. 283)

Where the:

Basic events - are the causal factors that will result in an initiating event when they occur in sufficient number and unfortunate order. These would be human, machine, or environmental factors.

Initiating events - are all the possible minor or major accidents (risks).

Consequences - are the possible results of the initiating event, up to the point of describing losses.

Losses - are the results of consequences. They describe mortality, injury, morbidity and property damage to the environment.

Costs - are the values placed on losses.

16, 17, 18. Current Activities, Planned Changes, New Programs.

A hazard analysis process should be applied to new programs, changes in programs and an analysis should already have been done for each existing program. These analyses should be viewed by the safety committee for final approval. Top management needs to be aware of the

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[4] For more detailed information on these methods refer to texts on safety management techniques such as Petersen 1980, 1988 and Roland, 1983.

activities carried out at operational level as they are the ones who will be ultimately responsible in the eventuality of any liability charges.

D) INFORMATION AND MONITORING PROCESSES.

These processes are represented by the following audit categories:

- 19. Information gathering
- 20. Staff performance reviews
- 21. Accident/incident monitoring
- 22. Planned safety audits

19. Information Gathering: This category checks the necessary information collecting methods to ensure contemporary practices are known and pertinent information is available on a daily basis for hazard identification purposes.

20. Staff Performance Reviews: These are another diagnostic tool and motivational device. First staff need to be observed in their various roles. Then they need to receive quality feedback on how they are performing in those roles. By conducting formal reviews staff can see that management does care and is making an effort towards them personally. All of the various functions of the staff member and their various needs can be monitored in this process. Goals and objectives can be determined that relate to how the individual fits into the entire organization not merely training needs which have been discussed earlier.

This process acts as a way for management to gain insight into the various stresses that are affecting the worker. A way of viewing the preparation of objectives from observed occurrences of inappropriate behavior is shown in figure 20. This figure can also be used to help generate staff training objectives.

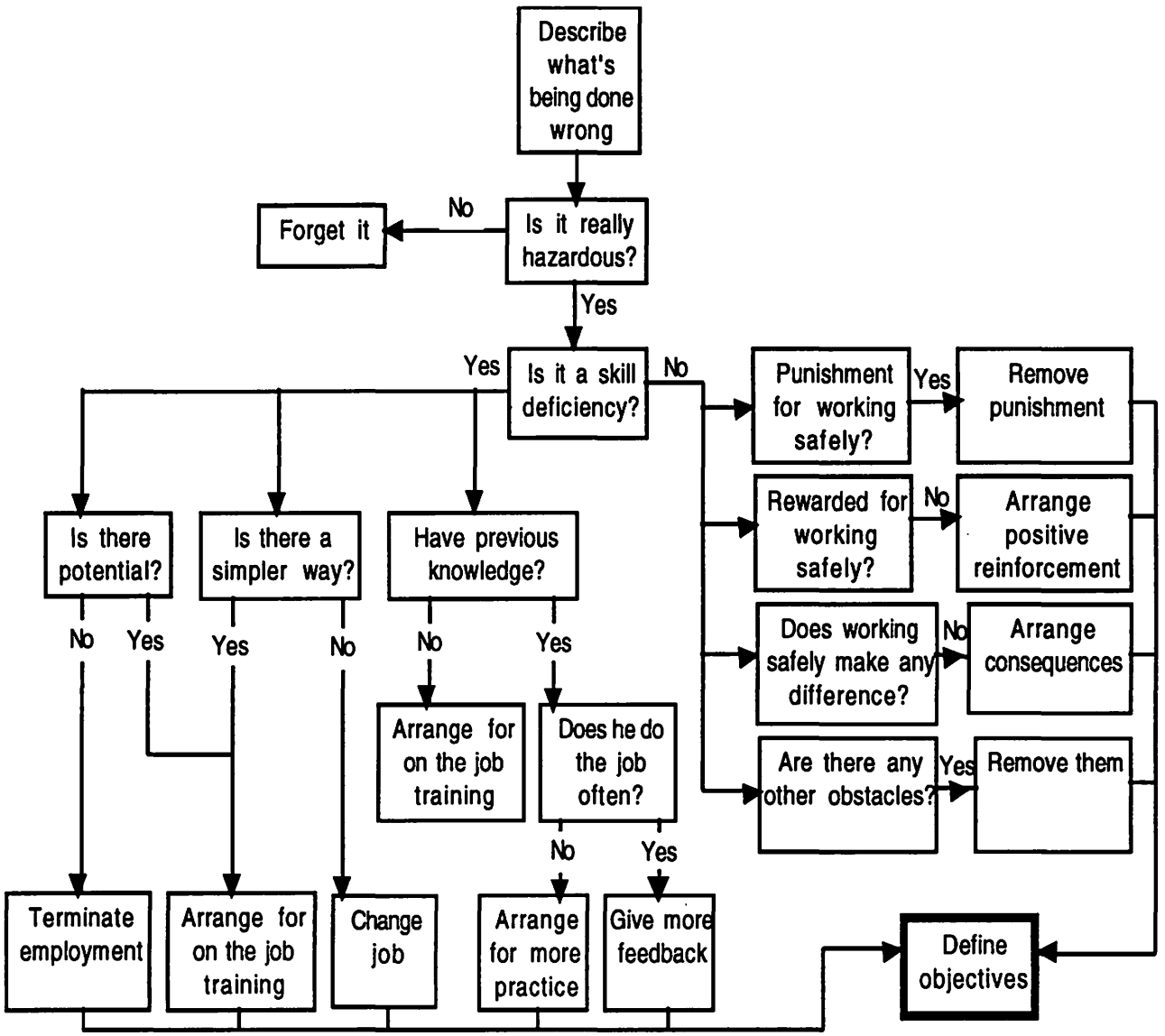

Figure 20: Preparing training objectives: the employee model.

From Petersen, 1988, p.59.

21. Accident/Incident Monitoring: In 1931 H.W.Heinrich, a pioneer in the field of safety management, laid down basic principles for accident causation and through this model a scientific process for decreasing their occurrence. Heinrich studied many thousands of industrial accidents and came up with the generalized results shown in figure 21 (Heinrich, 1959).

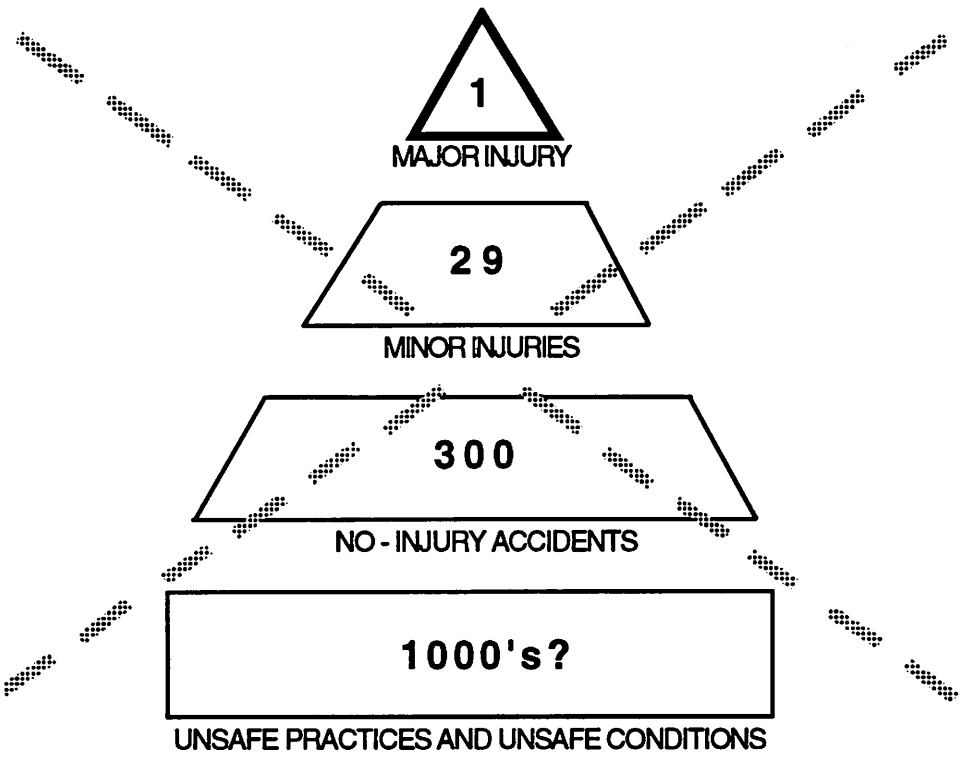

Figure 21: The foundation of a major injury. From Heinrich, 1959, p. 27.

This showed that in a unit of 330 accidents of the same kind and involving the same person, 300 result in no injuries, 29 in minor injuries, and 1 in a major lost-time injury. This shows the opportunity that exists to prevent the major incident by watching for tell-tale signs being forecast by smaller incidents and near misses occurring in the work place. Thus Heinrich's research shows the value in investigating and looking for trends in accidents, incidents and near misses.

As previously discussed under the heading of Staff Training, many types of accidents, especially severe injuries, are often not preceded by observable minor accidents or unsafe acts and conditions, but predictably occur in certain situations: unusual or nonroutine work, research and development work, and where high energy is involved. Thus analyzing reported accidents, incidents and unsafe acts and conditions must be augmented by training staff to deal with hazards in the situations where severe injuries predictably occur.

Heinrich also points out that underlying the pyramid is a larger but

unknown number of contributing unsafe practices and unsafe conditions. This is based on his Domino Theory of accident causation shown in figure 22. This model of accident causation is a linear one in which a preventable accident is thought of as a series of five factors in a sequence that results in an injury. Each step in the sequence is always the result of the factor that immediately precedes it. An accident then can be thought of as the fall of the Dominos, one against the other, leading to the injury.

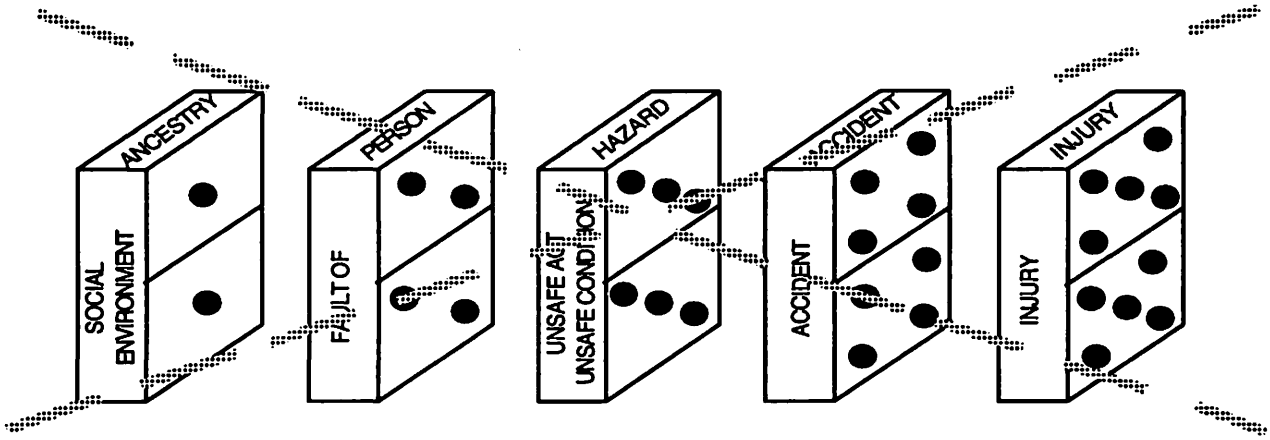

Figure 22: The five factors in the accident sequence; Domino Theory.
From Heinrich, 1959, p.14.

Heinrich's solution to the accident was to concentrate on the third factor; unsafe acts and conditions. By trying to identify these unsafe acts and conditions, by supervision or inspection, it was believed that most accidents could be prevented. It is now realized that this approach to accidents is too narrow a view of the accident chain. Today we know that behind every accident there lie many contributing causes that combine together in a random fashion to cause the accident. This is the theory of multiple causation (Petersen, 1988, p.10). Multiple causation says that it is important to look beyond the obvious unsafe act or condition for root causes, and these root causes often relate to the management system. Thus the observed unsafe act or condition should be viewed as a symptom of a problem with the management system.

This principle has already been utilized in the discussion of how to arrive at training objectives for staff using figure 20. If a linear approach to accident causation was used, and a staff member was observed performing incorrectly, the solution would be to blame the staff member and perhaps terminate their employment. Figure 20 shows that there may be multiple reasons why the staff member is not performing at a suitable standard and all the possible solutions are management driven.

Multiple causation theory says that it is important to look for trends in accidents, incidents and near misses, analyzing each one thoroughly for root causes. It is tempting to be content with discovering the easily observed unsafe act or condition but this should be considered a symptom of a more serious problem with the management system. A systematic approach that can be used to look for root causes of accidents, due to the management systems in an organization, is shown in figure 23. This shows that for any injury or loss due to an accident there may have been management errors due to systems failure, overloading of staff, selection of the wrong staff, incorrect training of those staff, poor environments chosen for those staff to work, or perhaps providing staff with poorly designed equipment.

Figure 24 takes a more detailed look at possible root causes for personnel performance errors. This diagram is an alternative way of approaching the same information contained in figure 20. It is important to restate this in alternative forms because often in adventure education, when an accident occurs, it is common to claim the cause of the accident was instructor judgement. Often staff are only too willing to buy into this analysis. Figure 24 illustrates again what the theory of multiple causation states: accident prevention is a management function.

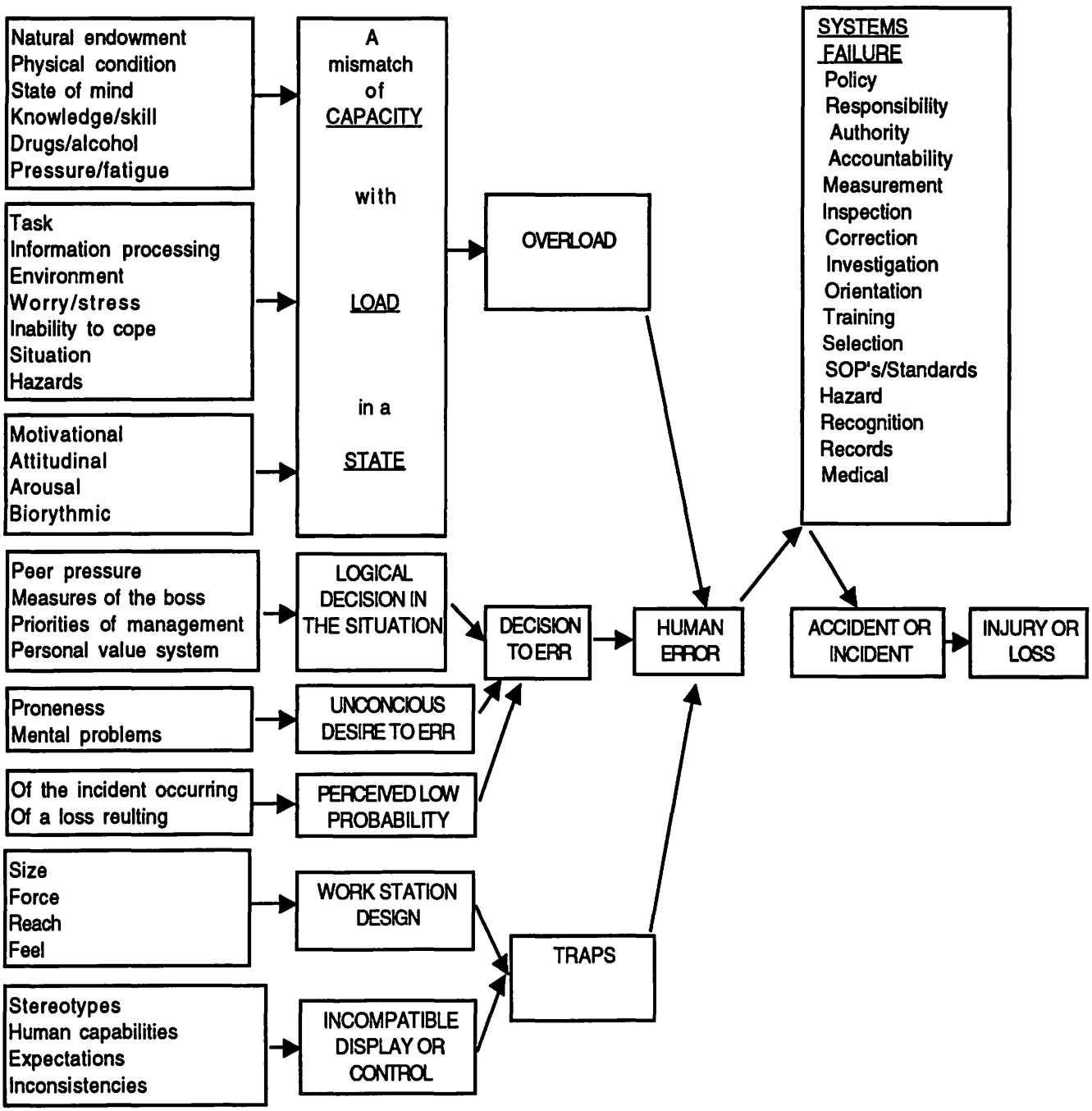

Figure 23: The causation model. From Petersen, 1988, p.14.

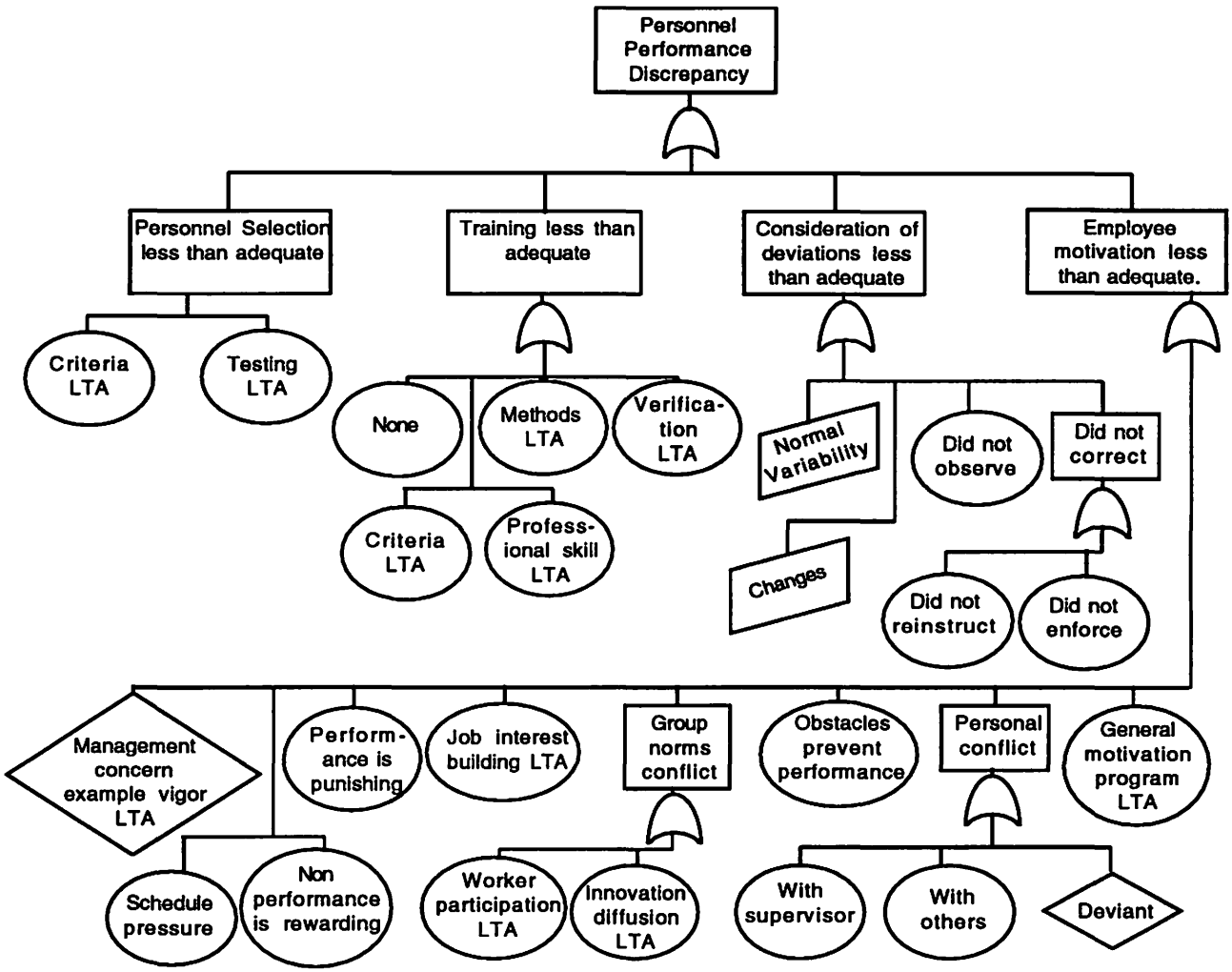

Figure 24: MORT Human Error Fault Tree. From Petersen, 1980, p.77.

In a similar way, important information can be gained by looking at the lessons learned in other organizations, and they can learn from yours. For this reason it is good practice to network accident/incident information through some collecting agency[5] so that trends on a larger scale can be observed and corrected.

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5 Alan Hale's International Safety Network was developed to help meet this need.

22. Planned Safety Audits: Planned evaluations of the safety effectiveness of an organization are important sources of feedback. There is a large amount the organization can do to audit itself. In terms of participative management, and making the safety program personally meaningful, it would be hard to find a better way than have members of the staff carry out an internal audit in a structured manner. The staff are aware of many of the hazards that exist in the work place and empowering them to find them, and find solutions, will enforce the necessity for a safety program at all. For this reason, and the byproduct of observational staff training, it is good practice to have staff continually involved in safety sampling practices such as those outlined in Part 3 of this audit.

The weakness with employee conducted audits is the need for an objective look at operational standards, and the uncovering of hazards of long-term potential; staff tend to be unaware of these. Other reasons to use external auditors include: uncovering or changing politically sensitive issues, when time is critical, when impartiality is necessary and when the prestige of an outsider would be helpful (Petersen, 1980, p.139). As discussed earlier, trained auditors will also have a depth of understanding of safety management theory which is unlikely to be equalled by any of the staff.

It is becoming standard practice in adventure education organizations to have an external audit carried out every second year. This gives an adequate amount of time to set the audit up and make an impact on suggested changes before the next one. Alternating this with a thorough internal audit on the in-between years is a good practice.

EQUIPMENT AND FACILITY INSPECTIONS:

The current state of both equipment and facilities will give a further indication of the effectiveness of the safety system operating within the organization.

23. Equipment Inspections: As explained earlier a quality program will be using quality equipment that meets contemporary standards. To maintain such equipment entails a rigorous inspection and maintenance program. Tidy and safe storage of equipment helps preserve the gear, the users, and the stress on the staff who go to use it.

Of special mention is the ergonomical design of equipment and combinations of equipment held in stock . Is the choice of equipment the

best available, in terms of its engineering, for the people who are going to be using it? Is it designed to fit the characteristics of the people using it? These questions relate to the environment in which it is to be used, the load it will get, the physical and mental demands it will place on the user and incompatibility with like units. Simple examples would be life jackets that are uncomfortable to wear, paddles that are heavy and if used on long trips result in repetitive strain injury (R.S.I.) for the users, having left feathered paddles and right feathered paddles the same color and so easily mixed, having locking carabiners with different locking mechanisms thus making it difficult to use effectively, etc.

24. Inspections of Facilities: The safety of staff and students is just as important inside as out. Many accidents occur within the buildings of residential complexes because the risks here are considered trivial in the minds of instructors who deal daily with more tangible risks in the field. Local authorities or government agencies may inspect buildings for certain mandatory requirements. This will not make another inspection any less effective, especially during the day-to-day running of the operation when it is likely to be seen in its most common state.

If you as auditor are unsure of codes for stairways, fire extinguisher placement, etc. these are easily obtainable for your country from various agencies.

PART THREE: Audit of the Physical Environment and Interaction of Other Factors.

(Method of auditing = safety sampling)

Within industry, one of the newer methods to measure safety effectiveness in the field is known as safety sampling. Safety sampling is based on the quality control principle of random sampling inspections to determine quality of output without making 100 percent inspections. Like all accountability systems safety sampling is also a good motivational tool, as each person wants to be sure they are operating as safely as possible when the sample is taken. To accomplish this, he or she must carry out some safety activities such as training. For this reason it is a good principle for organizations to incorporate safety sampling within normal work practice.

Safety sampling works by first preparing a code of unsafe and safe practices and conditions that may be observed in the activity to be

audited. The sample is then taken by checking each of the listed practices or conditions as they display themselves in the course of inspection. In this way the number of safe practices and conditions observed can be compared with the number of unsafe practices and conditions. Qualitative notes should be made as this is carried out for feedback to the people observed later.

Safety sampling can be easily adapted to the adventure education field. This practice not only audits the physical environment, it also audits the interaction of all the components of the safety system as they are exhibited through the behavior of the instructor in the field. These various interactions that are audited through safety sampling are shown in figure 25.

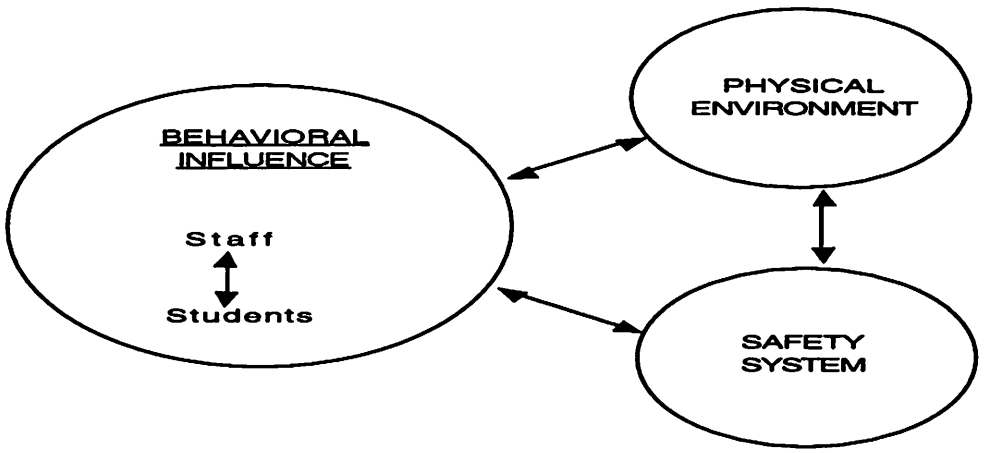

Figure 25: Interactions audited by safety sampling.

The key to safety sampling then is to compile a comprehensive list of conditions and acts that can be expected for any particular activity. This is straightforward if the organization has an operating hazard analysis program. The list can be compiled directly from the breakdown of risks and implemented management techniques for each activity. If the organization does not have this in place already this is a good opportunity for the auditor to initiate a hazard analysis system and show its value. There are many systems available from Fault Tree Analysis through to Failure Modes and Effects Analysis as discussed earlier. However the correct application of many of these methods requires significant training.

A hazard analysis instrument was developed that would be more

easily useable by the adventure educator. This is based on a technique used by the New Zealand Risk Management Training and Assessment organization. Their tool did not meet the criteria for a risk assessment model outlined in figure 19. For this reason it was expanded to produce the Risk Analysis and Management System (R.A.M.S.) shown in Part 3 of the audit. The way that the R.A.M.S. instrument meets the five criteria is shown in figure 26.

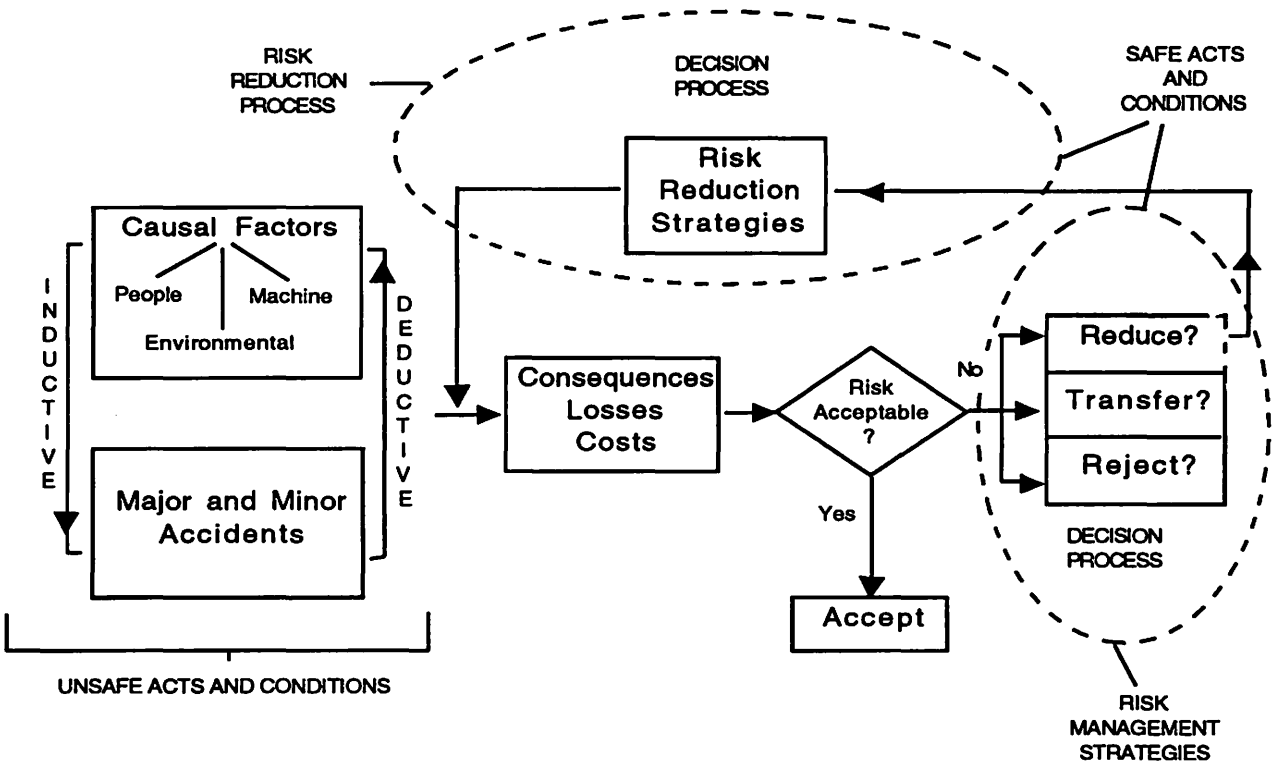

Figure 26: Risk analysis model used to determine safety sampling criteria.

As shown in figure 26, a risk analysis process can be either inductive or deductive. The R.A.M.S. system is deductive. First the undesired events (major and minor accidents) are documented for the activity. For each of these a list of causal factors are listed under the categories of people, equipment(machine) and environment. These are then considered subjectively in terms of consequences, losses and costs. If the risk is unacceptable management strategies are implemented for each of the causal factors. One way to help decide which management method to employ is based on a frequency/severity matrix shown in figure 27.

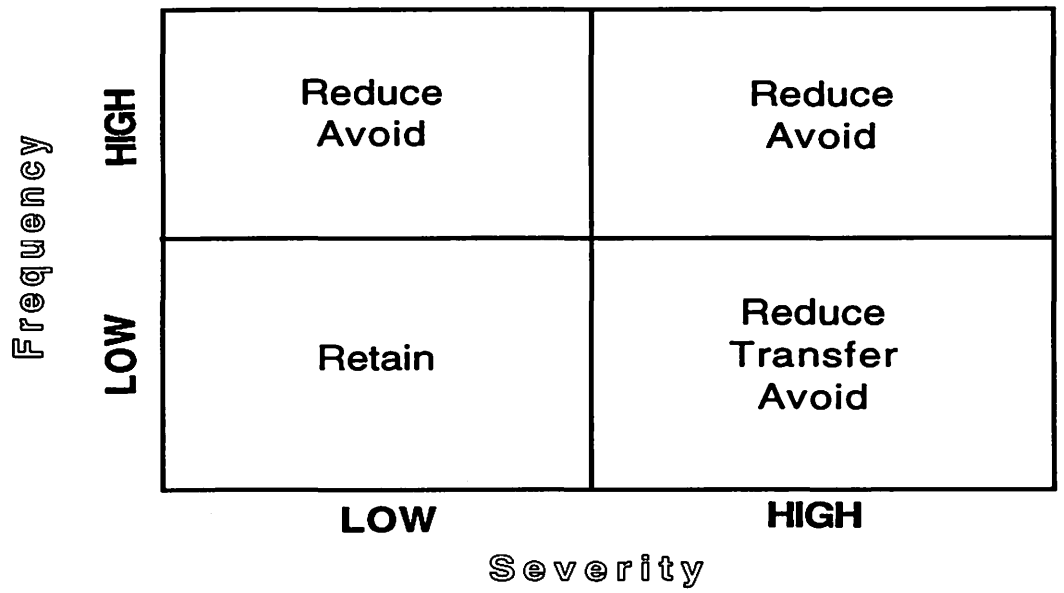

Figure 27: Risk management using a frequency/severity matrix. Adapted from Ewert, 1984, p.29.

If the frequency of the risk is high, no matter what the severity, it is unacceptable. Efforts must be made to reduce the frequency to an acceptable level. If this is not possible the risk should be avoided. If the severity of the risk is high, but frequency is low,then attempts should also be made to reduce the risk. If the risk can not be reduced suitably then it should be either avoided (documenting a policy) or transferred (if it is necessary to retain the risk to meet educational goals). Transferring means disclosing the risk to the participant and having them accept it or not. As discussed under liability this necessitates a participant that is sufficiently aware of the dangers to be able to make a decision. A typical use for transference is in adult skills courses that necessitates using situations of real risk. If the severity of the risk is low and frequency is high efforts should be made to reduce the risk. If this is not possible these risks should be avoided. We will accept those risks that we assess as being low in frequency and low in severity.

A strategy for deciding suitable risk reduction processes is shown in figure 28.

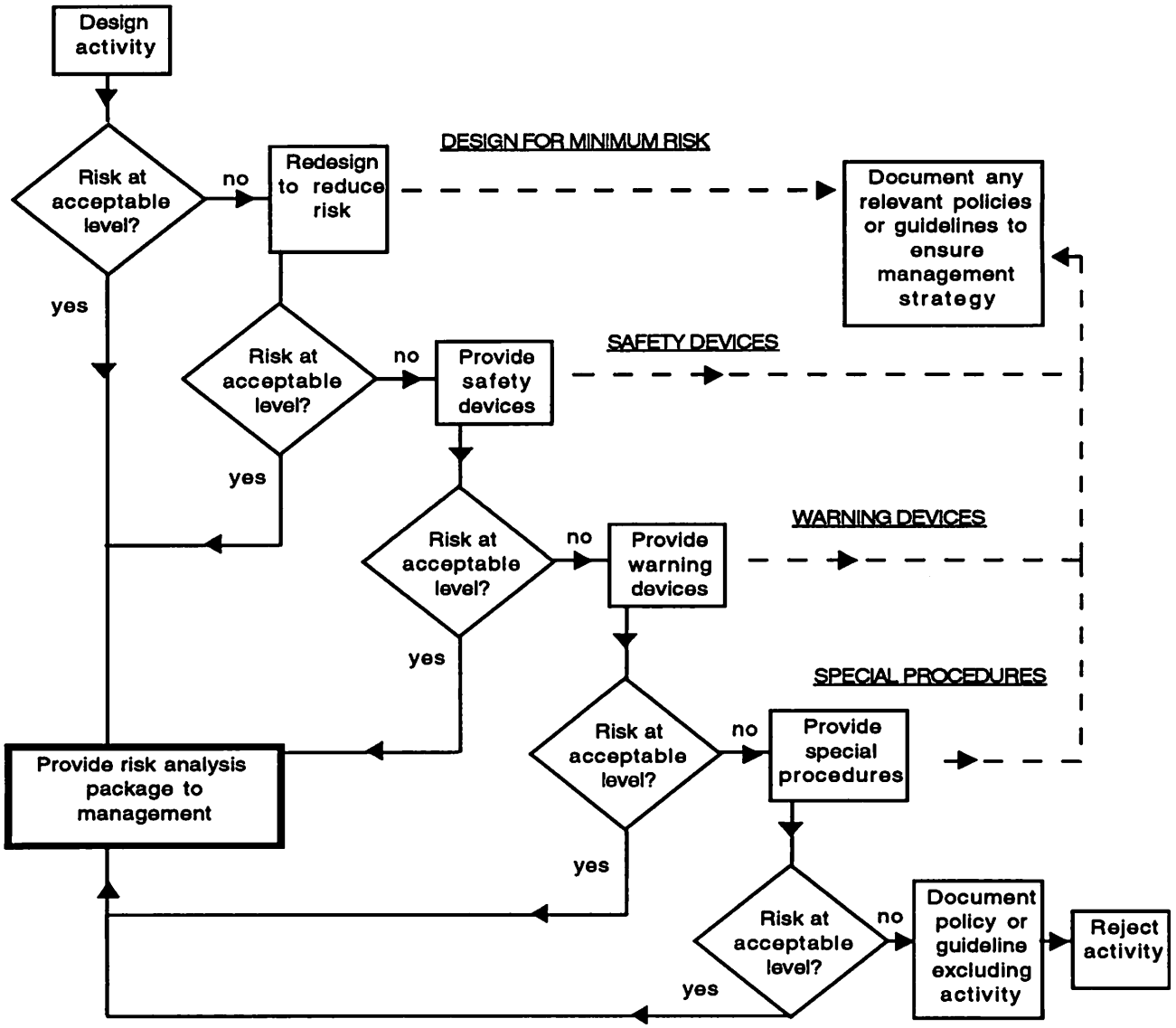

Figure 28: Decision-making process to decide risk reduction management strategies. Based on Hazard Reduction Precedence (Roland, 1983, p.40)

Once risk management techniques have been listed for each causal factor, the R.A.M.S. then calls for emergency management strategies to be listed. Emergency strategies are thought through and listed for the same reasons that the organization requires emergency preparedness plans:

efficiency in an emergency and hence minimization of damages. Relevant industry standards should be documented that apply to the activity, as these will reflect the management techniques chosen. Potential policies and guidelines for staff will naturally follow from the management techniques chosen as will suitable skill levels for staff.

The R.A.M.S. will therefore provide a list of unsafe acts and conditions to look for: from the list of causal factors. It will also provide a list of safe acts and conditions: from the list of management techniques, industry standards, policies and guidelines and necessary staff skills.

It should be noted that where the R.A.M.S. analysis has been designed to be easily adopted and used by practitioners in the adventure education industry, it has limitations due to its simplicity. More structured hazard analysis tools such as the F.T.A. and F.H.A. will more clearly show the interaction of factors leading to various accidents. They will also clearly indicate commonly occurring factors which lead to many accidents. The other tools are also better suited to analyze specific situations, e.g. F.M.E.A. is ideal to analyze the risks associated with mechanical equipment.

Another weakness with the R.A.M.S. tool is that in inexperienced hands it would be easy to slip into a linear (Domino Theory) interpretation of accident causation, where the user would simply look for a single causal factor for each major undesired event. In listing causal factors on the R.A.M.S. multiple causation theory must be used.

Despite the limitations of the R.A.M.S. analysis it still offers a lot of power to users. Another benefit is that if it is decided to apply other hazard analysis tools to a problem, the previously prepared R.A.M.S. analysis will make the task much easier.

CHAPTER III
ADMINISTERING THE AUDIT [1]

INformation on administering the audit is grouped in this chapter under the headings:

- Goals
- Prior to audit
- The audit itself
- Interpreting and summarizing results
- The final debrief
- The final report

GOALS:

In conducting an audit, the auditor(s) should always keep in mind the following goals for the audit.

- To provide feedback that will help the organization improve the quality of its safety program.
- To make the process a positive one for all involved.
- To be professional, acting as an appropriate role model, in all phases of the audit.
- To make suggestions based on how much more the organization can reasonably expect to do.

PRIOR TO AUDIT:

First contact:

The audit should be initiated in response to a request from the organization that wants its programs reviewed. It is important that the organization is open and cooperative to the entire audit procedure. You will want to be sure that their motive for carrying out the audit is a genuine desire to improve, not simply to have the process carried out for the purpose of meeting long range planning objectives without a desire to act on the findings. You need to find out:

- Who authorized the audit within the organization?
- Does it have the approval of all levels of staff/management?
- Who will receive the results?
- What will be done with them?

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1. This chapter uses information from the Outward Bound Safety Review Manual (Wade & Fischesser, 1988).

You as audit leader need to set the parameters for the audit with the organization. Agree on:

- what will the scope of the audit be in terms of field activities to be audited?
- who will be the contact person at management level within the host program?
- who will act as knowledgeable guide from the host program for the audit team?
- what are the budget constraints for the audit?
- what are the time constraints?

As audit leader, it is your responsibility to ensure that the parameters mentioned above will permit a quality audit to be carried out. The process can not be compromised by a lack of budget, or by time constraints, as this will be reflected in the results.

Selecting the team:

Once the guidelines are established it is necessary to decide on the other members who will make up the audit team. For a small organization, where the activities to be reviewed are within your field of expertise, there may be no team. For a larger organization, with widespread activities, and activities of varied nature, it will be necessary to carry out the audit in team fashion. The added advantages of a team approach are being able to finish the audit in a faster time, having a wider combined knowledge, skills and background to bring to the task, and most importantly, being able to discuss problems and share responsibility.

The team should be chosen for what they can offer individually to the entire audit team's effort. The potential team members should be discussed with the host program. Any controversial choice should be replaced with someone who is mutually agreeable. A participative and collaborative atmosphere should be established and maintained throughout the audit.

The ideal team would be a group of mature, technically skilled and experienced individuals who possess good listening and feedback skills. They should be objective, articulate, pleasant, tactful and diplomatic and have a concern for the development of the entire profession. They should have a wide and varied background in different aspects of the field of adventure education.

Background information:

You as leader should coordinate the dates of the audit with the team members and the host program. The length of the audit will be determined by the size and variety of the activities to be reviewed but will be rarely longer than seven days. The audit must be timed for when the activities to be reviewed will be in operation to permit observation and safety sampling.

Prior to the audit collect as much written material as possible that will orient the audit team to the program prior to arrival. This could include:

* Student orientation information
* brochures describing course programs
* trust board handbooks with mission statements and goals
* Instructor handbooks with policies and guidelines
* staff training plans
* past safety and accident/incident reports
* prior safety audits
* table of organizational structure
* job descriptions
* timetable of activities during the auditing period
* other information that will help to orient the auditors to the host program.

You should talk to the host program director and discuss any issues or concerns they believe the team should be aware of and focus on. There may be confidentiality issues that the audit team will have to respect.

The leader coordinates travel and accommodation of the team members.

Preparations at the host program:

Often the audit team will not have worked together before, and some will not have close knowledge of this audit process. It is a good idea to spend time upon first arriving at the program site getting to know each other. Have the host program's guide, who will be with the team throughout the process, at this meeting as well. Go through the audit itinerary and discuss the various roles of members of the team. Answer questions, ease anxieties, and generally set a positive tone for the audit.

When first arriving at the program offices make sure you meet the site management and introduce your team. The team should then be

introduced to the staff, and the audit process explained to them. Give these staff the opportunity to ask questions. The staff should be encouraged to be open, honest and candid. They should be told that they are encouraged and expected to share their safety concerns with the audit team members.

THE AUDIT ITSELF:

You as team leader are responsible for ensuring the parts of the audit, and scope of the audit as agreed to with the host program, are adequately covered. Assign tasks to various members of the team and have team meetings regularly to ensure the process is going smoothly. Auditors must maintain a professional demeanor at all times. Establish ground rules that include the following:

* appropriate behavior
* appropriate dress and language
* no criticism of the program or staff to participants
* no taking over activities, even if the auditor feels they can do it better than the staff they are observing
* no recruiting of staff or students for another program
* absolute confidentiality of findings.

Part 1: Staff Survey.

Get all members of the host program staff to complete the staff survey instrument. In addition interview as many of the staff as possible. The staff are the most knowledgeable about safety practices and concerns, and the management approaches operating within the organization that set the corporate climate. Interviews can be very informal; over a cup of tea or coffee, at a meal, or during a break in the programmed activities. When interviewing be aware of probing for signs of stress evident in the organization. Stress will often be the cause of inattention and accidents. The symptoms to be probed for are listed in figure 29.

Of note is the fact that there are many more unhealthy reactions than healthy, and that many of those reactions that are healthy to the worker are unhealthy to the organization. Unionizing can be translated as simply forming groups where the norms are different from those supported by the organization. This behavior is commonly seen in adventure education settings in the form of small groups of discontented

individuals who share resentments to one or more managers, often without verbalizing these thoughts directly to the managers involved.

REACTION OPTIONS					
HEALTHY REACTIONS For Individual		UNHEALTHY REACTIONS			
FIGHT	FLIGHT	FIGHT		FLIGHT	
		To Individual	To organization	To Individual	To organization
Unionize Participate - committees - quality circles Ignore rules Quit Subjective injuries - fake - users workers compensation Use sick leave Venting - scream room - hit room - kick dog	Get promoted	Hostility Frustration Stress & illness	Ignore rules Quit (turnover) Subjective injuries - fake Use workers compensation Alienation - sabotage Use sick leave	Ignore rules Accept mediocrity Turn off creativity Goal shifts Substance abuse	Accept mediocrity Turn off creativity Goal shifts Substance abuse

Figure 29: Reaction options to stress. From Petersen, 1988, p. 133.

If there are a large number of staff to be surveyed in the organization, auditors should consider the value of coding the response sheets to allow analysis for the different levels of management being surveyed. In this way it is possible to tell if any particular level has better or worse attitudes to their jobs than others. This may give valuable information on how best to implement improvements into the organizational systems. If this coding is done, auditors should take care not to breach their promise of anonymity to respondents.

Part 2: Safety System Audit:

You will need to arrange to go through this part of the audit with a well-informed member (or members) of the management staff of the host program. The best choice would be the program director and the safety officer. These may be the same person. Work through the categories one by one explaining your marking rationale as you proceed. You should have a good understanding of much of the host program's documentation already

which will speed up the process. Make notes as you proceed.

Note that scoring is carried out in two separate ways. The items marked 'PJ' are scored subjectively, up to the points indicated, based on your professional judgement as to how well the organization meets the criteria. Those marked 'AN' are simply awarded all the points, or none, depending on whether the criteria are met or not. Starred items require some form of verification that the criteria are being met.

It is possible that there are components of the safety system audit that are not applicable in the culture that you are applying it. Some language may also require modification to suit the program and culture. If possible make necessary changes to the document, and to scoring sheets before the audit is conducted.

Part 3: Physical environment and interaction of factors:

This part of the audit has the greatest potential to reveal quality feedback on the operating effectiveness of the host program's safety program. It also has the greatest potential to alienate host program staff to the audit process if carried out in an insensitive manner.

The first requirement of the auditors involved in safety sampling is that they are familiar with using the R.A.M.S. system, or an equivalent or better analysis tool, to prepare a list of safe and unsafe conditions/acts to audit for. The auditors should be constantly aware that there may be more than one way to achieve the program's goals, and manage different elements of risk. The host program may have a totally different way of doing something than the auditor is familiar with. They should be prepared to change their R.A.M.S. analysis to incorporate the host program's methods if they are suitable. Reviewers can expect to contribute their own ideas and experience, and also to take new ideas home.

The R.A.M.S. analysis takes time to complete, but will act as a valuable resource for the host program, their staff, and yourself in the future. Remember that any analysis is specific to location and implementation although there will be many similarities for the same activity transferred to a new setting. For example a R.A.M.S. analysis of a top roping session on an indoor wall will differ from one on an outside cliff, which in turn will differ from one on a cliff in the mountains. The audit team should discuss the R.A.M.S. analyses as a group before using them. The various components of the R.A.M.S. can be best developed using the combined experience of the team. An example of a completed R.A.M.S.

for a trust fall activity is shown in figure 30.

The auditor should adopt a non-participative observation role. Brief the instructor in charge of the session beforehand on what you intend to do, and ask if there are things you can do that will make it easier for them. Remember that many instructional staff will be intimidated by the audit process. Try to alleviate these fears, making them aware that you are not aiming to make value judgements about the instructor, but rather to provide quality feedback to management on the effectiveness of their systems. Be as unobtrusive as possible. There are times when having an observer present would not be appropriate in terms of dynamics happening in the group; e.g. processing and counselling. The auditor must always be sensitive to inappropriate intrusion. However, if the staff and students have been properly briefed, an audit team member is usually welcomed by the group. The auditor should be prepared to give a brief description of the purpose and benefits of safety audits when they are introduced to the group. Informing people why the team is present helps to create an open atmosphere and remove negative impressions of cold, impersonal investigators.

Auditors should be discrete in making notes and not make verbal comments, or nonverbal (body language) ones, about their interpretation of how the session is being conducted while the students are present. It is desirable to give the instructors feedback when an auditor has been observing an activity, when that activity is completed. Feedback to the instructor should cover positive features observed and any constructive points you may have to improve quality in the future. Generally, any major judgements about instructor actions, or lack of, in terms of safety practices (physical, social or emotional) should be communicated first to the host program manager. Making judgmental statements tends to close off further communication with the program staff. It is recommended that these personnel or activity issues be left for a later, more focussed, review when a range of opinions and views can be solicited.

It is imperative that the audit team discuss a proposed course of action for the possibility that they observe an action or condition which is obviously of great risk to participants. It would be extreme negligence to let the condition prevail, and allow a participant to get injured, but the situation is sensitive in overstepping the authority of the instructor in charge. Discuss your proposed plans with the management of the host program and get their approval.

RISK ANALYSIS AND MANAGEMENT SYSTEM

NAME: Instructor Jones **DATE:** 2/23/92

ACTIVITY/SITUATION: Trust Fall Initiative Exercise at Camp Little Lake

Analysis		Description		
UNDESIRED EVENT(S) Accident, injury, other forms of damage.		Faller hits ground from height and is injured Catchers are injured during the exercise Students do not want to take part in activity Faller is emotionally or socially damaged in activity, preventing participation in future events.		
CAUSAL FACTORS		**People**	**Equipment**	**Environment**
		Taught poor catching technique Taught poor falling technique Poor communication Poor group control Too few catchers Too many participants Students have special needs (fears, anxieties, etc.) Students medical problems	Inappropriate take-off point - too high - insecure - too uneven Inappropriate clothing Students wearing jewellery, watches, glasses, etc.	Uneven terrain for catchers Slippery terrain Weather unsuitable
RISK MANAGEMENT STRATEGIES	**Normal Operation**	Instructor aware of correct catching and falling techniques Instructor skilled at communication Instructor skilled at group control Set minimum number in group Set maximum number in group Have knowledge of group Disclose risks and precautions Use catching technique that is gender sensitive Use medical forms for participants to disclose history Allow challenge by choice	Choose appropriate take-off point Check it for secureness Have loose clothing tucked in Remove jewellery, glasses, etc	Choose site that is flat Check weather: past and present Be prepared to change activities if weather changes Dress for weather Check students dress
	Emergency	Have first aid kit at hand Instructor qualified in first aid skills Instructor skilled at group skills and communication to handle emergency Organization has prepared an emergency plan for injurues/accidents Take spare clothing if appropriate		

Figure 30: Completed R.A.M.S. analysis for trust fall activity.

RELEVANT INDUSTRY STANDARDS APPLICABLE	*Project Adventure - recommend a progression of trust activities leading up to the trust fall* *AEE - recommend participants remove jewellery and objects from pockets. Glasses should be retained by straps. Staff should explain group goals and dangers. Technique should involve catchers' hands 'zippered not held: leads to dislocation* *Recommend that the fall is from a height no greater than that of the catchers elbows.*
POLICIES AND GUIDELINES RECOMMENDED	*Instructors to have observed the exercise carried out by a senior member of staff previously* *The take-off point should be no higher than shoulder-height: elbow-height better* *Minimum of eight catchers in the group* *Maximum of 16 people in group* *Carry first aid kit* *Emergency plans on file*
SKILLS REQUIRED BY STAFF	*Instructors first aid certified* *Trained in group dynamics and communication skills* *Observed initiative exercises before*
FINAL DECISION ON IMPLEMENTING ACTIVITY	**Choose one** **Accept** ✓ **Reject** **Comments:** *Safe and challenging activity with precautions listed above*

Figure 30 cont.: Completed R.A.M.S. analysis of trust fall activity.

Inspection list of safe and unsafe acts and conditions.

Safe Acts and Conditions	Seen	Unsafe Acts and Conditions	Seen
Instructor Dependent Factors:			
Correct catching technique used		Poor catching technique used	
Correct falling technique used		Poor falling technique used	
Good clear instructions		Poor instructions given	
Good group control		Poor group control	
Good standard of supervision		Poor supervision	
Correct number of participants		Inappropriate number of participants	
Students special needs surveyed		Students special needs not surveyed	
Medical problems disclosed		Medical problems not disclosed	
Falling platform stable		Falling platform unstable	
Falling platform correct height		Falling platform incorrect height	
Appropriate clothing worn		Inappropriate clothing worn	
Clothing tucked in		Clothing loose and not tucked in	
Jewellery removed		Jewellery not removed	
Other objects (e.g. glasses) secured		Other objects left insecure	
Catchers standing on even terrain		Catchers standing on uneven terrain	
Weather suitable		Weather unsuitable	
Risks disclosed to students		Risks not disclosed to students	
Students allowed challenge by choice		Students not given option of participating	
First aid kit available		First aid kit not available	
Spare clothing available (if appropriate)		Spare clothing not available	
Management Dependent Factors:			
Instructor first aid certified		Instructor not certified	
Instructor trained in group dynamics		Instructor not trained in gp. dynamics	
Instructor trained in communication skills		Instructor not trained in communication skills	
Instructor has been trained in this exercise		Instructor not trained in this exercise	
Guidelines set for group numbers (max & min)		No guidelines set on group numbers	
Guidelines set for max height of falling platform		No guidelines set on height of platform	
Guidelines set to carry first aid kit		No guidelines set to carry first aid kit.	

Figure 30 cont.: Completed R.A.M.S. analysis of trust fall activity.

INTERPRETING AND SUMMARIZING RESULTS:

Part 1: Staff survey of behavioral influence:

Summary figures should be prepared that give an indication of indexes for

- hygiene factors	**Questions 1 - 12**
- motivation factors	**Questions 13 - 24**
- supportive relationships	**Questions 25 - 31**
- group decision making	**Questions 32 - 35**
- manager's performance goals	**Questions 36 - 37**
- participative approach in general	**Questions 25 - 37**
- safety goal setting and communicating	**Questions 38 - 40**
- safety participative involvement	**Questions 41 - 42**
- safety feedback and reinforcement	**Questions 43 - 44**
- safety training outcome	**Questions 45**
- safety program in general	**Questions 46**

These are calculated by calculating a mean score in each index (question group) for each staff member. An average mark between 1 and 7 (to two decimal figures) should be reported for each index. As these marks are calculated watch for trends which indicate factors found particularly good by staff, and those found consistently lacking. Also look for groups of staff who may be very dissatisfied with a particular index (score low consistently) and others who may be having their needs met well (score high consistently. Even one staff member who is dissatisfied with a particular aspect of the organization is worth noting. This could be the worst situation in some ways because a discontented social isolate could have unsafe behavior as his/her only outlet for their feelings of frustration.

An organizational mean for each index should then be calculated by averaging the means of each staff member in each index. The range for the index should also be noted. Other descriptive statistics should be calculated if necessary to adequately describe the resultant distribution e.g. standard deviation, mode(s), etc.

A mean score for any index of 3.0 or less would be considered low. An average for any index of 5.0 or more would be considered high. Scores between 3.0 and 5.0 indicate interpretation should be done with caution, taking into account other information attained from interview. The organization may be going through a transition period in the factor being

measured, individual results scoring in either extreme may be canceling each other out, or the factor may only be being achieved within the organization to an average level.

Plot the resultant means (with range) in graphical form to visually summarize results

The following chart will act as an aid to interpretation of results.

Factor	Low Score	High Score
Hygiene Factors	Extrinsic needs are not being met. Staff are dissatisfied with the conditions under which they work and their material and social rewards. Over time this will lead to disillusioned staff who become increasingly resentful of the organization. Their attitude to all aspects of work, including safety will suffer.	Extrinsic needs are being met. Staff are content with material and social rewards and the work conditions generally.
Motivation Factors	Intrinsic needs are not being met. Staff are not turned on by their work. They may not value their work, feel responsible, be involved in decisions. At best they will carry out their job in order to get material rewards. At worst they will be uninterested, unproductive and unsafe.	Intrinsic needs are being met. Staff are highly motivated to do well. They are keenly interested in their work and motivated to improve their product.
Supportive Relationships	Staff do not feel that management is interested in them and their safety. A result can be that they will not be safe.	Staff feel that management has a strong interest in them and their safety. They will attempt to be safe in return.

Factor	Low Score	High Score
Group Decision Making	Staff do not feel part of the decision making system. They are made to feel subordinate, dependent and passive. This reduces motivation to perform and can cause rebellion against the administration and imposed safety policies.	Staff feel empowered in the decision making system. They see themselves as equals, are independent and active in the organization. This leads to interest and motivation.
Manager's Performance Goals	Staff feel managers have an inappropriate style for them and show little recognition for their work. This can lead to resistance to the safety programs of management and loss of interest in work in general.	Staff feel that management style and recognition of their work is good. This leads to motivation to continue to perform well in the future.
Participative Approach in General	Staff feel they have little role in the workings of the organization. The best that can be expected is passive, dependent staff. At worst the staff rebel against the lack of involvement either directly against the hierarchy or by ignoring safety rules and guidelines.	Staff feel actively involved in all the workings and decisions of the organization. They feel aligned with it. As such they are motivated to help build a better and stronger organization as part of the team.
Safety Goal Setting and Communication	Staff are not aware of safety goals, are not made accountable for performance and are not driven to produce and expect quality. This leads to poor attainment of safety standards throughout the organization.	Staff are aware of safety goals, know they are accountable to them and understand that quality results are expected. This leads to staff striving for quality performance.
Safety Participative Involvement	Staff do not feel involved in the safety program and therefore are not committed to it.	Staff feel actively involved in the safety program and as such feel committed to it.

Factor	Low Score	High Score
Safety Feedback and Reinforcement.	Staff are not given enough feedback or reinforcement by good role modelling of expected behavior. As such they do not feel their work is valuable and do not know the standards that the organization expects. Their is no demand for quality performance and thus safety standards drop.	Staff are getting a good level of feedback and role modelling of expected behavior. They know the quality standards expected by the organization and strive to meet them.
Safety Training Outcomes.	Staff feel ill prepared for the jobs they are asked to do. They are placed in positions of stress because of this which compounds the safety problem further.	Staff feel well prepared for the jobs they are asked to perform. They are comfortable in their work and confident in their abilities to handle the work situation.

Graph the mean and range for each index on the form provided in the appendix. Summarize the qualitative feedback provided by staff in note form, stressing trends in particular; both favorable factors and those in need of improvement. Finally, summarize the background stress levels of staff according to the categories shown on the summary sheet.

Part 2: Safety system audit:

Summarize the results of the audit using the summary sheet in Appendix III. Graph the percentages attained for each index based on these results. At the end of this summarize the qualitative comments you have made.

Interpretations should be made of these figures with suggestions of improvements that could feasibly be implemented within the organization. For any section the scores can be interpreted as:

0% - 50%	Low - major components are missing from the safety system to adequately address this factor.
50% - 80%	Medium - The organization is making some efforts in this category however changes still need to be made to the safety system to ensure the factor in question is appropriately covered.
80% - 100%	High - The safety system is doing a good job at meeting the requirements of the factor in question. Some fine tuning is probably all that is required.

Low scores for any index can be interpreted:

MANAGEMENT DECISION PROCESSES:

1 Goals

The organization requires clearly defined and communicated goals in order to demonstrate to staff its commitment to safety and a quality product.

2 Accountability.

An accountability system must be established for every level of the organization so that everyone is aware of their role and the interdependence of roles. In this way people realize that they are responsible for the final delivery of that stated responsibility, and can be measured against the standard expected.

3 General communication

Communication lines must exist within the organization so that everyone is aware of what is happening at all other levels. In this way people will feel part of the general safety effort and feel they are part of a team working towards a common goal.

4 Safety protocols

An organization should possess a set of written protocols based on the knowledge gained from the past experience of staff within the organization and pre-emptive analysis of possible risks. These should be communicated to staff in order to set staff up for success in the field. When the organization states these protocols it is equally important to state the consequences of not following them. At the same time they should be worded in such a way as to be situationally variable so as not to restrict an instructor to following them when they would be unsuitable. There should also be a formal way for staff to have input into the alteration or addition of protocols so that they are empowered and have ownership of them.

5 Selection of staff

Staff should be screened in a systematic way in order to get the best match of skills for the role they are to fulfill.

6 Staff conditions

Staff should be working under conditions that eliminate unnecessary stress. This should allow suitable non-contact time, provide support in times of personal problems/issues, and opportunity for personal growth.

7 Emergency preparedness

Well thought out emergency plans will reduce stress on staff in times of emergency and help ensure the quality of response at those times.

8 Resources

The staff require quality resources in order to carry out quality programs. It is managements responsibility to make this happen.

9 Liability

The organization should take reasonable steps to protect itself from the possibility of litigation which could signal the end of any adventure education operation.

<u>WORK FLOW PROCESSES:</u>

10 Staff orientation

New staff, or staff assuming new roles in the organization, need to be

given a formal orientation to that role. This should include responsibilities, disclosure of risks and should be checked for completeness. A mentor should be formally appointed so that each staff member has someone whose responsibility is to answer questions and help with orientation. It should not be left up to the individual to continually have to impose their questions on others.

11 Staff training

Staff should be regularly setting goals for further training, with the help of management, and receive assistance to attain these goals. The quality that is expected of them should be demonstrated by good role models in the organization.

12 Programs

Programs should be set up to meet the same safety protocols expected of staff. In addition communication lines should be established so that parties in the field can be located should the need arise.

13 Screening participants

Participants should be screened for possible risks before any program is undertaken.

14 Medical program

The organization is required as part of its duty to the client to be able to provide quality treatment in case of incident occurring.

15 Personal equipment

Staff and students should be using quality equipment in any program to prevent unnecessary risk from this potential source.

HAZARD ANALYSIS PROCESSES:

16 Current activities

All activities should be systematically analyzed for potential risks. Management strategies should then be developed for each risk and this information available to staff. Technology and techniques change and so these plans should be updated at regular intervals. If staff see potential hazards in the field there should be a mechanism whereby there concerns can be officially registered and they know that they will be actioned.

17 Planned changes
All planned changes to programs should be analyzed for risks, and plans to manage the risk developed before the changes are implemented

18 New programs
All new programs should be analyzed for risks, and plans to manage the risk developed before the new programs are implemented)

INFORMATION AND MONITORING PROCESSES:

19 Information gathering
The organization should have available all contemporary information pertaining to its field of operations in order to make decisions.

20 Staff performance reviews
As a follow-up to accountability, staff should regularly take part in structured performance reviews in order to receive quality feedback on their to measure their achievement of set goals. This should allow a new set of goals to be set to motivate even higher quality in the future.

21 Accident/incident monitoring
A procedure should be in place that allows information to be gained from accidents/incidents/near misses such that they can be prevented from being repeated in the future. Multiple causation principles should be employed so that all causes are remedied.

22 Planned safety audits
Regular external audits should be planned and carried out so that the organization can get objective views of their safety effectiveness.

EQUIPMENT INSPECTIONS:

Steps should be taken to ensure that each type of equipment is in a safe operating condition and should be stored, have a maintenance program in place, and checked so the quality of operation is continually guaranteed.

INSPECTIONS OF FACILITIES:

Each building or facility should be made free from dangers to the users.

Part 3: Physical environment and interaction of factors:

For each activity, summarize observations on the summary sheet provided in Appendix IV. Do this first in a quantitative manner by simply stating the number of safe acts/conditions observed and the number of unsafe acts/conditions observed. Express the safety quality attained for the event as two percentages: one for the instructor dependent factors and a second for the management dependent factors. Where:

$$\text{safety quality} = \frac{\text{number of safe events}}{\text{total number of events}} \times 100$$

Summarize observations, both safe and unsafe, in the space provided and attach the completed R.A.M.S. analysis.

Making recommendations:

From the results of the individual parts of the audit the team should compile an interim report. This will summarize the safe acts/conditions, so that the host program can build on what it is doing well, and also the unsafe acts/conditions as feedback required to improve quality.

Each of the unsafe acts/conditions should be explained in full as to the impact it could have on the staff, participants and organization. It should then be assigned a quantitative risk score according to the formula below.

Risk Score = Consequences x Exposure x Probability

Where:

Consequences

Degree of severity of consequences

Catastrophe: numerous fatalities or extensive damages, major costs to organization, major disruption 100

Major: fatality or serious damages and costs to the organization 50

Serious: extremely serious or disabling injuries or large costs 25

Notable: injuries requiring professional medical attention, lost work time 10

Minor: minor cuts, bumps and bruises; minor damage 1

Exposure

The hazard event occurs

Continuously: many times daily	10
Frequently: approximately daily	6
Usually: from once a week to once a month	3
Occasionally: from once a month to once per year	2
Rarely: has been known to occur or known to be possible	1

Probability

That the accident sequence, including consequences, will occur:

Most likely: expected result and consequences	10
Quite possible: would not be unusual, an even 50/50 chance	6
Unusual: unlikely to occur, but not to be ruled out	3
Rarely: extremely unlikely but has been known to happen	1

Examples:

1) A high zip-wire (flying fox), used every day by groups, is found to have a defective pulley due to no inspection program being in place:

risk score = (C=50) x (E=10) x (P=10) = 5000

2) A low ropes course element does not use any form of spotting for its students:

risk score = (C=1) x (E=10) x (P=6) = 60

Obviously the assigning of scores is a subjective process but is very helpful in ranking faults according to seriousness. It should be kept in mind as a rough guide that a risk score:

Greater than 250 indicates a condition requiring immediate correction. The activity should be discontinued until the hazard is reduced.

90 - 250 is urgent. Requires attention as soon as possible.

20 - 90 should be eliminated without delay, but the situation is not an emergency.

The team then needs to recommend changes that will improve the quality of the program. These need to be realistic in terms of what the organization can be expected to achieve with its resources. The recommendations should be prioritized according to Justification Score,

where:

$$\text{Justification score} = \frac{\text{Risk Score}}{\text{Cost factor X Degree of Correction}}$$

Cost Factor

Estimate of dollar cost and difficulty of corrective change

Large: many thousands of dollars; difficult and lengthy 10
Moderate: hundreds of dollars; average time and effort 5
Easy: very little cost; fast and simple changes 1

Degree of Correction

The degree the proposed change will eliminate or alleviate the hazard

100% 1
>75% 2
50% - 75% 3
25% - 50% 4
<25% 6

Examples: Consider again the examples given above in terms of the following recommendations.

1) Recommend that the program
   a) Discontinues using the zip line until;
   b) A new pulley is purchased of appropriate standard, and
   a monthly inspection and maintenance program is put in place.

Justification a) = 5000 / ((CF = 1) x (DC = 1)) = **5000**
As cost is nothing and it provides 100% correction.

Justification b) = 5000 / ((CF = 5) x (DC = 1)) = **1000**
As cost is over $100 and the inspection program should completely solve future problems.

2) Recommend that staff are trained in contemporary spotting techniques and that having students spot each other becomes an operating procedure for low ropes elements, written into the staff handbook.

Justification = 60 / ((CF = 1) x (DC = 2)) = **30**
As the cost is minor assuming someone on the staff can instruct

others, and the effect these changes will have should eliminate the hazard more than 75% of the time.

As seen from the small case history above, the priority we would suggest is:

1) Discontinue zip line use until other corrections made . . . 5000
2) Buy industry standard pulley and institute monthly inspection and maintenance program 1000
3) Train staff in spotting and write procedure into staff manual for low ropes course elements 30

THE FINAL DEBRIEF.

Once the summaries and recommendations are completed a final debrief should be held with the host program. This should include key program managers and safety trustees from the host program, along with the audit team. The team leader should chair the meeting and be responsible for its format.

The purpose of this debrief is to share the observations and reflections of the audit team. New ideas are explained face-to-face so that no surprises appear in the final report. The team may wish to reword or withdraw certain recommendations after learning more about a particular subject in the debriefing.

As the team leader reviews the observations and recommendations in each category, the points for improvement should be balanced by things the program is doing well. It is helpful to remind the host program several times during the meeting that there are too many positive points to comment on them all.

Generally the audit team and the host organization should be able to agree on reasonable recommendations to address the problems observed. The audit team must be cognizant of their duty to the public to assure safety and should not back down on making tough recommendations, including closure or postponement of programs, if this is felt necessary.

THE FINAL REPORT.

The team leader incorporates comments and notes from all the auditors into a final report containing a prioritized list of recommendations for improvement in safety as discussed above. There should be a narrative account of exactly which elements of the host program were observed and audited.

A typical format for the final report is:

* statistics of the audit; place, dates, team members, etc.
* overview of the scope of the organization's operations.
* improvements needed in safety management.
* narrative of what the review team did and did not look at.
* summary sheets from each part of the audit.

Because there is the possibility that the report could be used as evidence in legal proceedings, broad criticisms and opinions that are not related to facts or observations should be avoided. The report must not contain judgmental phrases, instead it should contain reported observations, and reasonable inferences based on these.

Improvements that the audit team considers need to be made should be grouped under three headings: Required, recommended and suggested. The contents of each should be obvious.

In phrasing improvements consider what will be an acceptable response. If there are several satisfactory solutions to the problems identified, then give the program some latitude and ownership in coming up with the solution that works best for them. It is appropriate, if many solutions exist, to phrase the improvement required so that the problem is stated and the degree of correction required is also stated. How they choose to meet these criteria can be up to them.

e.g. "Students were observed while rock climbing belaying in such a way that the control rope was rarely in a locked-off position. This could result in a long fall for the climber and/or rope burn for the belayer. The program should adopt and teach a method for belaying where the rope is locked-off for the maximum period of time. This technique should be documented in the staff handbook."

If only one response is acceptable, then the specific course of action should be recommended.

e.g. "When students are climbing at Shaky Rock Crag they should all wear helmets. This should be a policy in the staff handbook".

These guidelines should help to provide you and your audit team with the necessary information to conduct a quality audit, producing valuable feedback for the host program.

APPENDIX I
Summary of responsibilities for safety audits [2]

Audit Team Leader:

1. Sets dates with host program
2. Selects audit team members
3. Discusses issues for audit with host program
4. Sends orientation materials to team members
5. Arranges transport and accommodation with host program
6. Designs audit schedule
7. Coordinates actual audit
8. Leads final debrief
9. Writes final report
10. Sends report draft to team members for approval
11. Sends report to host program

Host Program:

1. Sets dates with review team leader
2. Approves audit team members
3. Provides all pertinent documents
4. Arranges logistics of audit
5. Assigns a guide to the audit team
6. Is available for interviews
7. Present at final debrief
8. Actions results of audit

Audit Team Members:

1. Reviews material from host program
2. Arranges most economic transport to audit site
3. Sends travel itinerary to team leader
4. Takes notes on observations during the audit
5. Contributes to the audit process in mature and constructive manner
6. Contributes at final debrief
7. Reviews draft of final report and informs team leader of approval and/or input

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2. This is based on information from the Outward Bound Safety Review Manual 1986.

Review Team Guide from Host Program:

1. Fully briefed on audit team visit, mission, needs and logistics
2. Serves as an advisor and guide to the audit team
3. Present throughout entire audit visit

Host Program Safety Committee Chair:

1. Is informed on plans for review
2. Contributes issues for audit team to address
3. Briefs safety committee on the audit
4. Arranges committee members to present for all or part of audit
5. Attends final debrief
6. Acts on audit recommendations

APPENDIX II

Summary Sheet

Staff Attitudes Survey

Hygiene factors . . . . . .

Indicated as well done:

Indicated as need improvement:

Summary Index
Mean:
Range: -
Other Statistics:

Motivation factors . . . . . .

Indicated as well done:

Indicated as need improvement:

Summary Index
Mean:
Range: -
Other Statistics:

Supportive relationships . . . . . .

Indicated as well done:

Indicated as need improvement:

Summary Index
Mean:
Range: -
Other Statistics:

Group decision making . . . . . .

Indicated as well done:

Indicated as need improvement:

Summary Index
Mean:
Range: -
Other Statistics:

Manager's performance goals . . . . . .

Indicated as well done:

Indicated as need improvement:

Summary Index
Mean:
Range: -
Other Statistics:

Participative approach in general . . . . . .

Indicated as well done:

Indicated as need improvement:

Summary Index
Mean:
Range: -
Other Statistics:

Safety: goal setting and communicating

Indicated as well done:

Indicated as need improvement:

Summary Index
Mean:
Range: -
Other Statistics:

Safety: participative involvement. . . . . .

Indicated as well done:

Indicated as need improvement:

Summary Index
Mean:
Range: -
Other Statistics:

Safety: feedback and reinforcement. . . . .

Indicated as well done:

Indicated as need improvement:

Summary Index
Mean:
Range: -
Other Statistics:

Safety: outcomes. . . . . .

Indicated as well done:

Indicated as need improvement:

Summary Index
Mean:
Range: -
Other Statistics:

Safety: program in general . . . . . .

Indicated as well done:

Indicated as need improvement:

Summary Index
Mean:
Range: -
Other Statistics:

Summary of past behavioral influences:

Percentage of staff with scores greater than 300 . . . . . _____%

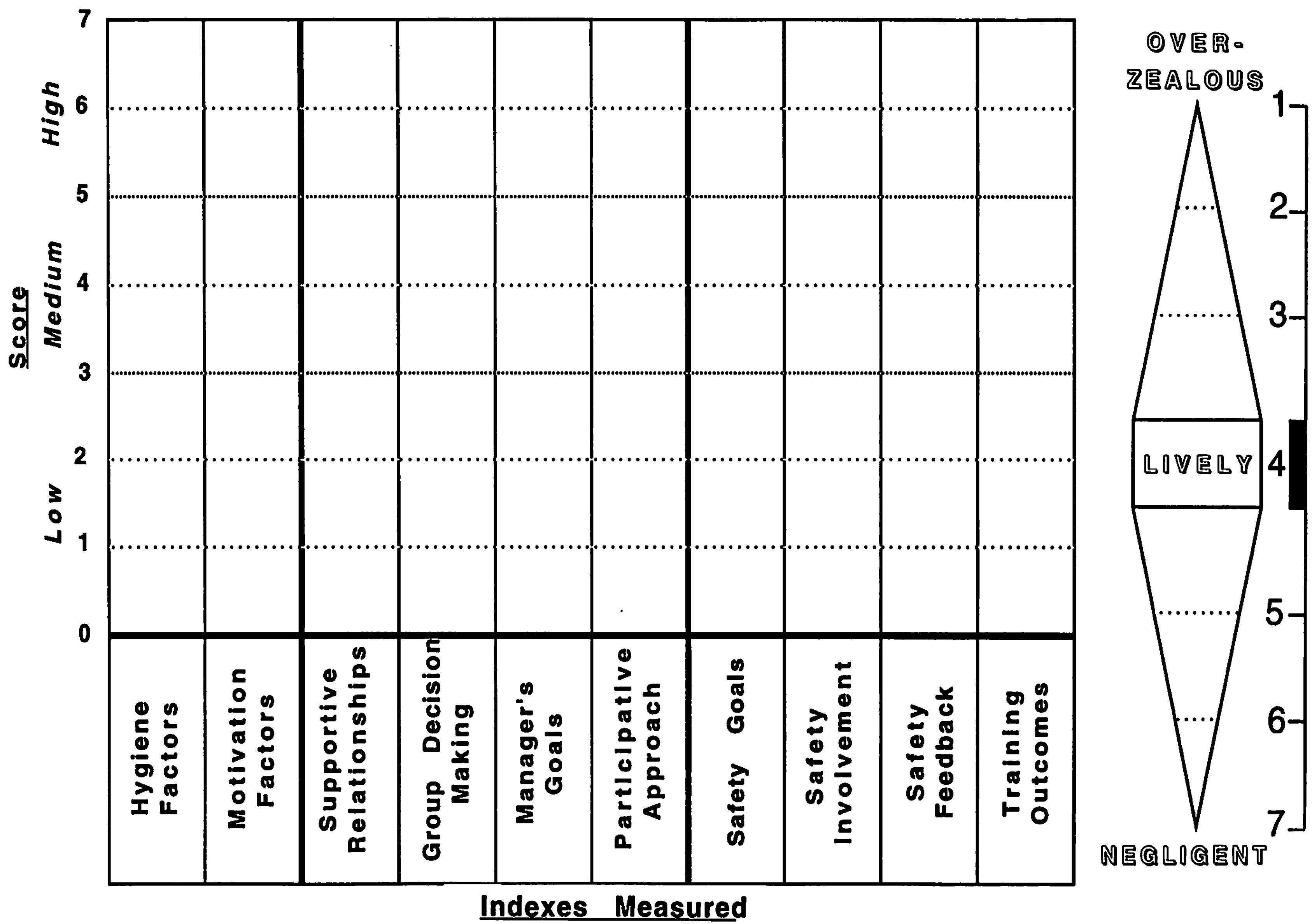
Percentage of staff with score 200 - 300 . . . . . _____%

Percentage of staff with score 100 - 200 . . . . . _____%

Percentage of staff with score less than 100 . . . . . _____%

Summary of qualitative remarks:

Summary of Part 1: Staff Attitudes Survey.



APPENDIX III
Summary Sheet
Safety System Audit

MANAGEMENT DECISION PROCESSES:	Score	Percent
1 Goals	/ 160	%
2 Accountability	/ 170	%
3 General communication	/ 130	%
4 Safety protocols	/ 245	%
5 Selection of staff	/ 155	%
6 Staff conditions	/ 50	%
7 Emergency preparedness	/ 200	%
8 Resources	/ 95	%
9 Liability	/ 155	%
TOTAL:	/1340	%

	Score	Percent
WORK FLOW PROCESSES:		
10 Staff Orientation	/ 130	%
11 Staff training	/ 165	%
12 Programs	/ 40	%
13 Screening participants	/ 105	%
14 Medical program	/ 85	%
15 Personal equipment	/ 75	%
TOTAL:	/ 600	%
HAZARD ANALYSIS PROCESSES:		
16 Current activities	/ 165	%
17 Planned changes	/ 80	%
18 New programs	/ 80	%
TOTAL:	/ 325	%

INFORMATION AND MONITORING PROCESSES:	Score	Percent
19 Information gathering.	/ 65	%
20 Staff performance reviews	/ 130	%
21 Accident/incident monitoring.	/ 260	%
22 Planned safety audits.	/ 105	%
TOTAL:	/ 560	%

EQUIPMENT INSPECTIONS:	Score	Percent
Equipment type _____	/ 215	%
Equipment type _____	/ 215	%
Equipment type _____	/ 215	%
Equipment type _____	/ 215	%
Equipment type _____	/ 215	%
Equipment type _____	/ 215	%
Equipment type _____	/ 215	%
TOTAL:	/	%

		Score	Percent
INSPECTIONS OF FACILITIES:			
Building or facility	_____	___/ 120	_____ %
Building or facility	_____	___/ 120	_____ %
Building or facility	_____	___/ 120	_____ %
Building or facility	_____	___/ 120	_____ %
Building or facility	_____	___/ 120	_____ %
Building or facility	_____	___/ 120	_____ %
Building or facility	_____	___/ 120	_____ %
Building or facility	_____	___/ 120	_____ %
Building or facility	_____	___/ 120	_____ %
Building or facility	_____	___/ 120	_____ %
Building or facility	_____	___/ 120	_____ %
Building or facility	_____	___/ 120	_____ %
TOTAL:		___/___	_____ %

QUALITATIVE COMMENTS:

Summary of Part 2: Safety System Audit

Indexes Measured	Category	Score (%) LOW 0–10	10–20	20–30	30–40	40–50	MEDIUM 50–60	60–70	70–80	HIGH 80–90	90–100
1. Goals	Management Decision Processes										
2. Accountability											
3. General Communication											
4. Safety Protocols											
5. Selection of Staff											
6. Staff Conditions											
7. Emergency Preparedness											
8. Resources											
9. Liability											
10. Staff Orientation	Work Flow processes										
11. Staff Training											
12. Programs											
13. Screening Participants											
14. Medical Program											
15. Personal Equipment											
16. Current Activities	Hazard Analysis										
17. Planned Changes											
18. New Programs											
19. Info Gathering	Information & Monitoring										
20. Performance Reviews											
21. Accident Monitoring											
22. Planned Audits											

APPENDIX IV

Summary Sheet

Physical Environment & Interaction of Factors

Activity/event observed: _____

	Instructor Dependent	Management Dependent
Number of safe conditions/acts observed:	_____	_____
Number of unsafe conditions/acts observed:	_____	_____
Safety quality	_____%	_____%

Summary of observations:

Risk score: C _____ x E _____ x P _____ = _____

Recommendations:

Justification score: Risk score ÷ (CF _____ x DC _____) = _____

APPENDIX V

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